

# SEQUENCE LISTING

<110> NIPPON SHOKUBAI CO., LTD.

<120> Method for producing 1,3-propanediol and 3-hydroxypropionic acid

<130> PH-2376-PCT

<150> JP 2004-093417

<151> 2004-03-26

<150> JP 2004-124524

<151> 2004-04-20

<160> 75

<170> PatentIn version 3.1

<210> 1

<211> 558

<212> PRT

<213> Lactobacillus reuteri

<400> 1

Met Lys Arg Gln Lys Arg Phe Glu Glu Leu Glu Lys Arg Pro Ile His  
1 5 10 15

Gln Asp Thr Phe Val Lys Glu Trp Pro Glu Glu Gly Phe Val Ala Met  
20 25 30

Met Gly Pro Asn Asp Pro Lys Pro Ser Val Lys Val Glu Asn Gly Lys  
35 40 45

Ile Val Glu Met Asp Gly Lys Lys Leu Glu Asp Phe Asp Leu Ile Asp  
50 55 60

Leu Tyr Ile Ala Lys Tyr Gly Ile Asn Ile Asp Asn Val Glu Lys Val  
65 70 75 80

Met Asn Met Asp Ser Thr Lys Ile Ala Arg Met Leu Val Asp Pro Asn  
85 90 95

Val Ser Arg Asp Glu Ile Ile Glu Ile Thr Ser Ala Leu Thr Pro Ala

100	105	110
Lys Ala Glu Glu Ile Ile Ser	Lys Leu Asp Phe Gly	Glu Met Ile Met
115	120	125
Ala Val Lys Lys Met Arg Pro Arg Arg Lys Pro Asp Asn Gln Cys His		
130	135	140
Val Thr Asn Thr Val Asp Asn Pro Val Gln Ile Ala Ala Asp Ala Ala		
145	150	155 160
Asp Ala Ala Leu Arg Gly Phe Pro Glu Gln Glu Thr Thr Thr Ala Val		
165	170	175
Ala Arg Tyr Ala Pro Phe Asn Ala Ile Ser Ile Leu Ile Gly Ala Gln		
180	185	190
Thr Gly Arg Pro Gly Val Leu Thr Gln Cys Ser Val Glu Glu Ala Thr		
195	200	205
Glu Leu Gln Leu Gly Met Arg Gly Phe Thr Ala Tyr Ala Glu Thr Ile		
210	215	220
Ser Val Tyr Gly Thr Asp Arg Val Phe Thr Asp Gly Asp Asp Thr Pro		
225	230	235 240
Trp Ser Lys Gly Phe Leu Ala Ser Cys Tyr Ala Ser Arg Gly Leu Lys		
245	250	255
Met Arg Phe Thr Ser Gly Ala Gly Ser Glu Val Leu Met Gly Tyr Pro		
260	265	270
Glu Gly Lys Ser Met Leu Tyr Leu Glu Ala Arg Cys Ile Leu Leu Thr		
275	280	285
Lys Ala Ser Gly Val Gln Gly Leu Gln Asn Gly Ala Val Ser Cys Ile		
290	295	300

Glu Ile Pro Gly Ala Val Pro Asn Gly Ile Arg Glu Val Leu Gly Glu  
305 310 315 320

Asn Leu Leu Cys Met Met Cys Asp Ile Glu Cys Ala Ser Gly Cys Asp  
325 330 335

Gln Ala Tyr Ser His Ser Asp Met Arg Arg Thr Glu Arg Phe Ile Gly  
340 345 350

Gln Phe Ile Ala Gly Thr Asp Tyr Ile Asn Ser Gly Tyr Ser Ser Thr  
355 360 365

Pro Asn Tyr Asp Asn Thr Phe Ala Gly Ser Asn Thr Asp Ala Met Asp  
370 375 380

Tyr Asp Asp Met Tyr Val Met Glu Arg Asp Leu Gly Gln Tyr Tyr Gly  
385 390 395 400

Ile His Pro Val Lys Glu Glu Thr Ile Ile Lys Ala Arg Asn Lys Ala  
405 410 415

Ala Lys Ala Leu Gln Ala Val Phe Glu Asp Leu Gly Leu Pro Lys Ile  
420 425 430

Thr Asp Glu Glu Val Glu Ala Ala Thr Tyr Ala Asn Thr His Asp Asp  
435 440 445

Met Pro Lys Arg Asp Met Val Ala Asp Met Lys Ala Ala Gln Asp Met  
450 455 460

Met Asp Arg Gly Ile Thr Ala Ile Asp Ile Ile Lys Ala Leu Tyr Asn  
465 470 475 480

His Gly Phe Lys Asp Val Ala Glu Ala Ile Leu Asn Leu Gln Lys Gln  
485 490 495

Lys Val Val Gly Asp Tyr Leu Gln Thr Ser Ser Ile Phe Asp Lys Asp

500	505	510
Trp Asn Val Thr Ser Ala Val	Asn Asp Gly Asn Asp Tyr Gln Gly Pro	
515	520	525
Gly Thr Gly Tyr Arg Leu Tyr	Glu Asp Lys Glu Glu Trp Asp Arg Ile	
530	535	540
Lys Asp Leu Pro Phe Ala Leu	Asp Pro Glu His Leu Glu Leu	
545	550	555

<210> 2  
 <211> 1677  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 2  
 atgaaacgtc aaaaacgatt tgaagaacta gaaaaacggc caattcatca agatacattt 60  
 gttaaagaat ggccagaaga aggtttcgtt gcaatgatgg ggcctaataa ccctaagcct 120  
 agtgtaaaag ttgaaaatgg caagatcgta gagatggatg gtaaaaagct cgaagatttt 180  
 gatttgattg acttgtacat tgctaagtat ggaatcaata ttgacaacgt tgaaaaagtt 240  
 atgaatatgg attctaccaa gattgcacgg atgcttggtg atcctaattg ttctcgtgat 300  
 gaaattattg aaattacatc agctttgact cctgctaagg ctgaagagat catcagtaag 360  
 cttgattttg gtgaaatgat tatggctgtc aagaagatgc gccacgctgc taagcctgac 420  
 aaccagtgtc acgttaccaa tactgttgat aaccagttc aaattgctgc tgatgctgct 480  
 gatgccgtc ttctgtgatt tccagaacaa gaaaccacga cagctgtggc acgttatgca 540  
 ccattcaatg ctatttcaat tttaattggt gcacaaacag gtcgccctgg tgtattgaca 600  
 caatgttctg ttgaagaagc tactgaattg caattaggta tgcgtgggtt taccgcatat 660  
 gctgaaacca tticagttaa cggctactgat cgtgtattta ccgatggtga tgatactcca 720  
 tggctctaaag gcttcttggc atcttgttat gcacacgtg gtttgaagat gcgatttact 780  
 tcagggtgcc gttcagaagt ttgatgggt tatccagaag gtaagtcaat gctttacctt 840  
 gaagcgcgtt gtattttact tactaaggct tcagggtgtc aaggacttca aaatggtgcc 900

gtaagttgta ttgaaattcc tgggtgctgtt cctaattgta ttcgtgaagt tctcggtgaa 960  
 aacttgttat gtatgatgtg tgacatcgaa tgtgttcttg gttgtgacca agcataactca 1020  
 cactccgata tgcggcggac tgaacggttt atttgtcaat ttattgccgg tactgattat 1080  
 attaactctg gttactcatc aactcctaac tacgataata ccttcgctgg ttcaaact 1140  
 gatgctatgg actacgatga tatgtatgtt atggaacgtg acttgggtca atattatggt 1200  
 attcaccctg ttaaggaaga aaccattatt aaggcacgta ataaggccgc taaagccctt 1260  
 caagcagtat ttgaagatct tggattacca aagattactg atgaagaggt cgaagcagca 1320  
 acgtatgcta acacccatga tgacatgcc aagcgggata tggttgcaga tatgaaggct 1380  
 gctcaagata tgatggatcg tgggaattact gctattgata ttatcaaggc attgtacaac 1440  
 cacggattta aagatgtcgc tgaagcaatt ttgaaccttc aaaaacaaaa agttgttggt 1500  
 gattaccttc aaacatcttc tatttttgat aaagattgga acgtcacttc tgctgttaac 1560  
 gacggaaatg attatcaagg accaggtact ggataccgtc tatatgaaga caaggaagaa 1620  
 tgggatcgga ttaaagactt accattcgcc ctgatccag aacatttgga actgtag 1677

<210> 3  
 <211> 558  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 3

Met Lys Arg Gln Lys Arg Phe Glu Glu Leu Glu Lys Arg Pro Ile His  
 1 5 10 15

Gln Asp Thr Phe Val Lys Glu Trp Pro Glu Glu Gly Phe Val Ala Met  
 20 25 30

Met Gly Pro Asn Asp Pro Lys Pro Ser Val Lys Val Glu Asn Gly Lys  
 35 40 45

Ile Val Glu Met Asp Gly Lys Lys Arg Glu Asp Phe Asp Leu Ile Asp  
 50 55 60

Leu Tyr Ile Ala Lys Tyr Gly Ile Asn Ile Asp Asn Val Glu Lys Val  
65 70 75 80

Met Asn Met Asp Ser Thr Lys Ile Ala Arg Met Leu Val Asp Pro Asn  
85 90 95

Val Ser Arg Glu Ser Ile Ile Glu Ile Thr Ser Ala Leu Thr Pro Ala  
100 105 110

Lys Ala Glu Glu Ile Ile Ser Lys Leu Asp Phe Gly Glu Met Ile Met  
115 120 125

Ala Ile Lys Lys Met Arg Pro Arg Arg Lys Pro Asp Asn Gln Cys His  
130 135 140

Val Thr Asn Thr Val Asp Asn Pro Val Gln Ile Ala Ala Asp Ala Ala  
145 150 155 160

Asp Ala Ala Leu Arg Gly Phe Pro Glu Gln Glu Thr Thr Thr Ala Val  
165 170 175

Ala Arg Tyr Ala Pro Phe Asn Ala Ile Ser Ile Leu Ile Gly Ala Gln  
180 185 190

Thr Gly Arg Pro Gly Val Leu Thr Gln Cys Ser Val Glu Glu Ala Thr  
195 200 205

Glu Leu Gln Leu Gly Met Arg Gly Phe Thr Ala Tyr Ala Glu Thr Ile  
210 215 220

Ser Val Tyr Gly Thr Asp Arg Val Phe Thr Asp Gly Asp Asp Thr Pro  
225 230 235 240

Trp Ser Lys Gly Phe Leu Ala Ser Cys Tyr Ala Ser Arg Gly Leu Lys  
245 250 255

Met Arg Phe Thr Ser Gly Ala Gly Ser Glu Val Leu Met Gly Tyr Pro

260	265	270
Glu Gly Lys Ser Met Leu Tyr	Leu Glu Ala Arg Cys Ile	Leu Leu Thr
275	280	285
Lys Ala Ser Gly Val Gln Gly	Leu Gln Asn Gly Ala Val	Ser Cys Ile
290	295	300
Glu Ile Pro Gly Ala Val Pro	Asn Gly Ile Arg Glu Val	Leu Gly Glu
305	310	320
Asn Leu Leu Cys Met Met Cys	Asp Ile Glu Cys Ala Ser	Gly Cys Asp
325	330	335
Gln Ala Tyr Ser His Ser Asp	Met Arg Arg Thr Glu Arg	Phe Ile Gly
340	345	350
Gln Phe Ile Ala Gly Thr Asp	Tyr Ile Asn Ser Gly Tyr	Ser Ser Thr
355	360	365
Pro Asn Tyr Asp Asn Thr Phe	Ala Gly Ser Asn Thr Asp	Ala Met Asp
370	375	380
Tyr Asp Asp Met Tyr Val Met	Glu Arg Asp Leu Gly Gln	Tyr Tyr Gly
385	390	400
Ile His Pro Val Gln Glu Glu	Thr Ile Ile Lys Ala Arg	Asn Lys Ala
405	410	415
Ala Lys Ala Leu Gln Ala Val	Phe Glu Asp Leu Gly Leu	Pro Lys Ile
420	425	430
Thr Asp Glu Glu Val Glu Ala	Ala Thr Tyr Ala Asn Thr	His Asp Asp
435	440	445
Met Pro Lys Arg Asp Met Val	Ala Asp Met Lys Ala Ala	Gln Asp Met
450	455	460

Met Asp Arg Gly Ile Thr Ala Ile Asp Ile Ile Lys Ala Leu Tyr Asn  
 465 470 475 480

His Gly Phe Lys Asp Val Ala Glu Ala Val Leu Asn Leu Gln Lys Gln  
 485 490 495

Lys Val Val Gly Asp Tyr Leu Gln Thr Ser Ser Ile Phe Asp Lys Asp  
 500 505 510

Trp Asn Ile Thr Ser Ala Val Asn Asp Gly Asn Asp Tyr Gln Gly Pro  
 515 520 525

Gly Thr Gly Tyr Arg Leu Tyr Glu Asp Lys Glu Glu Trp Asp Arg Ile  
 530 535 540

Lys Asp Leu Pro Phe Ala Leu Asp Pro Glu His Leu Glu Leu  
 545 550 555

<210> 4  
 <211> 1677  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 4  
 atgaaacgtc aaaaacgttt tgaagaacta gaaaagcggc caattcatca agatacattt 60  
 gttaaggaat ggccctgaaga aggtttcgtt gcaatgatgg gtccaaatga cccgaagcca 120  
 agtgtaaagg ttgaaaacgg taaaattgtc gaaatggatg gcaagaagcg ggaagacttt 180  
 gacttaattg acctctacat tgctaagtat ggaattaata ttgataacgt tgaaaaagtt 240  
 atgaatatgg attcaactaa aattgcacgg atgttggttg atccaaatgt ctcacgtgaa 300  
 tccatcattg aaattacttc tgcactaact ccagcgaaag ccgaagaaat cattagtaag 360  
 ottgactttg gtgaaatgat tatggctatc aagaagatgc gtccgcgtcg gaagccggat 420  
 aaccaatgtc acgttaccaa cacggttgat aaccagttc aaattgctgc tgatgctgct 480  
 gatgctgcgc ttcgtggttt cccagaacaa gaaactacta ctgccgttgc ccgttatgca 540  
 ccatttaatg ctatttcaat cttaattggg gctcaaacag gtcgtcctgg tgtattaaca 600



caatgttctg ttgaagaagc aacogaattg caattaggaa tgcgtggctt taccgcttat 660  
 gctgaaacta tttcagttta tggactgac cgggtattta ctgatggtga tgatacacca 720  
 tggctaaaag gattccttgc atcatgttat gcacgcgtg gtttgaagat gcggtttact 780  
 tcaggtgctg gttcagaagt tttgatgggt taccagaag gtaagtcaat gttatatctt 840  
 gaagcacgtt gtattttact taccaaggct tcagggtgtc aaggacttca aaacggtgcc 900  
 gtaagttgta ttgaaattcc aggtgctgtt cctaacggtc tccgtgaagt tcttggtgaa 960  
 aacctattat gtatgatgtg tgatattgaa tgtgcttctg gttgtgacca agcatactca 1020  
 cactcagata tgcggcgtag tgaacggttt attggtcaat ttattgccgg tactgattac 1080  
 attaattctg gttactcatc aactcctaac tacgataaca cctttgctgg ttcaaacacc 1140  
 gatgcaatgg actacgatga catgtatgtt atggaacgtg acttaggtca atactatggt 1200  
 attcaccag ttcaagaaga aacaattatt aaggctcgta acaaggctgc taaggcatta 1260  
 caagctgtat ttgaagatct tggactacct aagattactg atgaagaagt tgaagctgct 1320  
 acatatgcta acactcatga tgacatgcc aacgtgaca tggttgcaga tatgaaagcc 1380  
 gctcaagata tgatggatcg tggcattact gctattgata ttattaaggc tctttataac 1440  
 catggattta aggatgttgc tgaagctgta ttgaacctc aaaagcaaaa ggttgtcgg 1500  
 gattacctc aaacttcatc aatctttgac aaggattgga atatcactc tgccgtaaat 1560  
 gacgggaatg actaccaagg tccaggtact ggataccgtc tatatgaaga caaggaagaa 1620  
 tgggatcgaa tcaaagatct tccattcgca cttgatccag aacacttgga actatag 1677

<210> 5  
 <211> 236  
 <212> PRT  
 <213> *Lactobacillus reuteri*

<400> 5

Met Ala Asp Ile Asp Glu Asn Leu Leu Arg Lys Ile Val Lys Glu Val  
 1 5 10 15

Leu Ser Glu Thr Asn Gln Ile Asp Thr Lys Ile Asp Phe Asp Lys Ser

20	25	30
Asn Asp Ser Thr Ala Thr Ala Thr Gln Glu Val Gln Gln Pro Asn Ser		
35	40	45
Lys Ala Val Pro Glu Lys Lys Leu Asp Trp Phe Gln Pro Val Gly Glu		
50	55	60
Ala Lys Pro Gly Tyr Ser Lys Asp Glu Val Val Ile Ala Val Gly Pro		
65	70	75
80		
Ala Phe Ala Thr Val Leu Asp Lys Thr Glu Thr Gly Ile Pro His Lys		
85	90	95
Glu Val Leu Arg Gln Val Ile Ala Gly Ile Glu Glu Glu Gly Leu Lys		
100	105	110
Ala Arg Val Val Lys Val Tyr Arg Ser Ser Asp Val Ala Phe Cys Ala		
115	120	125
Val Gln Gly Asp His Leu Ser Gly Ser Gly Ile Ala Ile Gly Ile Gln		
130	135	140
Ser Lys Gly Thr Thr Val Ile His Gln Lys Asp Gln Asp Pro Leu Gly		
145	150	155
160		
Asn Leu Glu Leu Phe Pro Gln Ala Pro Val Leu Thr Pro Glu Thr Tyr		
165	170	175
Arg Ala Ile Gly Lys Asn Ala Ala Met Tyr Ala Lys Gly Glu Ser Pro		
180	185	190
Glu Pro Val Pro Ala Lys Asn Asp Gln Leu Ala Arg Ile His Tyr Gln		
195	200	205
Ala Ile Ser Ala Ile Met His Ile Arg Glu Thr His Gln Val Val Val		
210	215	220

Gly Lys Pro Glu Glu Glu Ile Lys Val Thr Phe Asp  
 225 230 235

<210> 6  
 <211> 711  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 6  
 atggctgata ttgatgaaaa cttattacgt aaaatcgta aagaagtttt aagcgaaact 60  
 aatcaaactg atactaagat tgactttgat aaaagtaatg atagtactgc aacagcaact 120  
 caagaggatg aacaacaaaa tagtaaagct gttccagaaa agaaacttga ctggttccaa 180  
 ccagttggag aagcaaaacc tggatattct aaggatgaag ttgtaattgc agtcggtcct 240  
 gcattcgcaa ctgttcttga taagacagaa actggtattc ctcataaaga agtgcttcgt 300  
 caagttattg ctggtattga agaagaaggg ctttaaggcgc gggtagttaa agtttaccgg 360  
 agttcagatg tagcattctg tgctgtccaa ggtgatcacc tttctggttc aggaattgct 420  
 attggtatcc aatcaaaagg gacgacagtt attcaccaaa aggatcaaga ccctcttggt 480  
 aaccttgagt tattccaca agcgccagta cttactcccg aaacttatcg tgcaattggt 540  
 aagaatgccg ctatgtatgc taagggtgaa tctccagaac cagttccagc taaaaacgat 600  
 caacttgctc gtattcacta tcaagctatt tcagcaatta tgcattatcg tgaaactcac 660  
 caagttgttg ttgtaagcc tgaagaagaa attaaggta cgtttgatta a 711

<210> 7  
 <211> 236  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 7  
 Met Ala Asp Ile Asp Glu Asn Leu Leu Arg Lys Ile Val Lys Glu Val  
 1 5 10 15  
 Leu Asn Glu Thr Asn Gln Ile Asp Thr Lys Ile Asn Phe Asp Lys Glu  
 20 25 30

Asn Asn Ser Thr Ala Thr Ala Thr Glu Glu Val Gln Gln Pro Asn Ser  
35 40 45

Lys Ala Val Pro Glu Lys Lys Leu Asp Trp Phe Gln Pro Ile Gly Glu  
50 55 60

Ala Lys Pro Gly Tyr Ser Lys Asp Glu Val Val Ile Ala Val Gly Pro  
65 70 75 80

Ala Phe Ala Thr Val Leu Asp Lys Thr Glu Thr Gly Ile Pro His Lys  
85 90 95

Glu Val Leu Arg Gln Val Ile Ala Gly Ile Glu Glu Glu Gly Leu Lys  
100 105 110

Ala Arg Val Val Lys Val Tyr Arg Ser Ser Asp Val Ala Phe Cys Ala  
115 120 125

Val Gln Gly Asp His Leu Ser Gly Ser Gly Ile Ala Ile Gly Ile Gln  
130 135 140

Ser Lys Gly Thr Thr Val Ile His Gln Lys Asp Gln Asp Pro Leu Gly  
145 150 155 160

Asn Leu Glu Leu Phe Pro Gln Ala Pro Val Leu Thr Pro Glu Thr Phe  
165 170 175

Arg Ala Ile Gly Lys Asn Ala Ala Met Tyr Ala Lys Gly Glu Ser Pro  
180 185 190

Glu Pro Val Pro Ala Lys Asn Asp Gln Leu Ala Arg Ile His Tyr Gln  
195 200 205

Ala Ile Ser Ala Ile Met His Ile Arg Glu Thr His Gln Val Val Val  
210 215 220

Gly Lys Pro Glu Glu Glu Ile Lys Val Thr Phe Asp

225

230

235

&lt;210&gt; 8

&lt;211&gt; 711

&lt;212&gt; DNA

<213> *Lactobacillus reuteri*

&lt;400&gt; 8

```

atggctgata tcgatgaaaa ttacttcgt aagatcgta aagaagttt aaacgagact    60
aatcaaattg atactaagat caattttgac aaggaaaata atagtaccgc aactgctact    120
gaagaagttc aacaacccaa cagcaaggca gttcctgaaa agaaacttga ttggttccaa    180
ccaattggcg aagcaaaacc aggttactca aaggatgaag ttgtaatcgc agttggtcct    240
gcctttgcaa cagttctaga taaaacagaa actgggattc ctcataaaga ggtacttcgt    300
caagtaattg ccggaattga agaagaggga cttaaagcac gagtagttaa agtctatcgt    360
tcatcagacg ttgctttctg tgctgttcag ggtgaccact tatctggttc aggaattgca    420
attggaatcc aatctaaggg aacaactgtt attcaccaaa aagaccagga tccattagga    480
aacctagaat tattccaca agctccggtt ctacaccag aaactttccg ggcaattggt    540
aagaatgcag caatgtacgc taaaggtgaa tctccagaac cagttccagc taagaacgat    600
caacttgctc gtattcacta ccaagctatt tcagcaatta tgcatattcg tgaaactcac    660
caagttgttg ttggaaagcc tgaagaagaa atcaaagta cgttcgatta a          711

```

&lt;210&gt; 9

&lt;211&gt; 172

&lt;212&gt; PRT

<213> *Lactobacillus reuteri*

&lt;400&gt; 9

```

Met Met Ser Glu Val Asp Asp Leu Val Ala Lys Ile Met Ala Gln Met
1           5           10          15

```

```

Gly Asn Ser Ser Ser Ala Asn Ser Ser Thr Gly Thr Ser Thr Ala Ser
20          25          30

```

```

Thr Ser Lys Glu Met Thr Ala Asp Asp Tyr Pro Leu Tyr Gln Lys His

```

35	40	45
Arg Asp Leu Val Lys Thr	Pro Lys Gly His Asn Leu	Asp Asp Ile Asn
50	55	60
Leu Gln Lys Val Val Asn Asn Gln Val Asp	Pro Lys Glu Leu Arg Ile	
65	70	75 80
Thr Pro Glu Ala Leu Lys Leu Gln Gly Glu Ile Ala Ala Asn Ala Gly		
85	90	95
Arg Pro Ala Ile Gln Lys Asn Leu Gln Arg Ala Ala Glu Leu Thr Arg		
100	105	110
Val Pro Asp Glu Arg Val Leu Glu Met Tyr Asp Ala Leu Arg Pro Phe		
115	120	125
Arg Ser Thr Lys Gln Glu Leu Leu Asn Ile Ala Lys Glu Leu Arg Asp		
130	135	140
Lys Tyr Asp Ala Asn Val Cys Ala Ala Trp Phe Glu Glu Ala Ala Asp		
145	150	155 160
Tyr Tyr Glu Ser Arg Lys Lys Leu Lys Gly Asp Asn		
165	170	

<210> 10  
 <211> 519  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 10	
atgatgagtg aagttgatga tttagtagca aagatcatgg ctcagatggg aaacagttca	60
tctgctaata gctctacagg tacttcaact gcaagtacta gtaaggaaat gacagcagat	120
gattaccac tttatcaaaa gcaccgtgat ttagtaaaaa caccaaaaagg acacaatctt	180
gatgacatca atttacaaaa agtagtaaat aatcaagttg atcctaagga attacggatt	240
acaccagaag cattgaaact tcaagtgaa attgcagcta atgctggccg tccagctatt	300

caaaagaatc ttcaacgagc tgcagaatta acacgagtac ctgacgaacg ggttcttgaa 360  
 atgtatgatg cattgcgtcc tticcgttca actaagcaag aattattgaa cattgcaaag 420  
 gaattacggg acaagtatga cgctaagtgt tgcgcagcat ggtttgaaga agctgctgat 480  
 tattatgaaa gtcgtaagaa gctaaagggc gataactaa 519

<210> 11  
 <211> 171  
 <212> PRT  
 <213> *Lactobacillus reuteri*

<400> 11

Met Ser Glu Val Asp Asp Leu Val Ala Lys Ile Met Ala Gln Met Gly  
 1 5 10 15

Asn Ser Ser Ser Ser Asp Ser Ser Thr Ser Ala Thr Ser Thr Asn Asn  
 20 25 30

Gly Lys Glu Met Thr Ala Asp Asp Tyr Pro Leu Tyr Gln Lys His Arg  
 35 40 45

Asp Leu Val Lys Thr Pro Ser Gly Lys Lys Leu Asp Asp Ile Thr Leu  
 50 55 60

Gln Lys Val Val Asn Asp Gln Val Asp Pro Lys Glu Leu Arg Ile Thr  
 65 70 75 80

Pro Glu Ala Leu Lys Leu Gln Gly Glu Ile Ala Ala Asn Ala Gly Arg  
 85 90 95

Pro Ala Ile Gln Lys Asn Leu Gln Arg Ala Ala Glu Leu Thr Arg Val  
 100 105 110

Pro Asp Glu Arg Val Leu Gln Met Tyr Asp Ala Leu Arg Pro Phe Arg  
 115 120 125

Ser Thr Lys Gln Glu Leu Leu Asp Ile Ala Asn Glu Leu Arg Asp Lys

130

135

140

Tyr His Ala Glu Val Cys Ala Ala Trp Phe Glu Glu Ala Ala Asn Tyr  
 145 150 155 160

Tyr Glu Ser Arg Lys Lys Leu Lys Gly Asp Asn  
 165 170

<210> 12  
 <211> 516  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 12  
 atgagtgaag ttgatgattt agtagcaaag atcatggcac agatgggaaa tagctcatct 60  
 tccgatagtt caacaagtcg tacttcaaca aataacggta aggaaatgac agcagatgac 120  
 tatcctcttt accaaaagca ccgtgattta gtaaagacac catcaggaaa gaaacttgat 180  
 gatattactt tacaaaaggt tgtaaagat caagttgatc caaaagaatt acggattact 240  
 ccagaagcat taaaacttca aggtgagatc gcagcaaacg ctggtcggcc agcaattcaa 300  
 aagaacttac aacgggcagc tgaattaaca cgtgttcag acgaacgtgt tttgcaaatg 360  
 tatgatgcat tacggccatt ccgttcaacg aagcaagaat tactagatat tgctaatgaa 420  
 ctccgtgata aatatcatgc agaagtatgt gcagcttggt ttgaagaagc tgcaaattac 480  
 tatgaaagtc gaaagaagct caagggtgat aactag 516

<210> 13  
 <211> 379  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 13

Met Gly Gly Ile Ile Pro Met Glu Lys Tyr Ser Met Pro Thr Arg Ile  
 1 5 10 15

Tyr Ser Gly Thr Asp Ser Leu Lys Glu Leu Glu Thr Leu Asn Asn Glu  
 20 25 30



Arg Ile Leu Leu Val Cys Asp Ser Phe Leu Pro Gly Ser Asp Thr Leu  
35 40 45

Lys Glu Ile Glu Ser His Ile Lys Asp Asn Asn Lys Cys Glu Ile Phe  
50 55 60

Ser Asp Val Val Pro Asp Pro Pro Leu Asp Lys Ile Met Glu Gly Val  
65 70 75 80

Gln Gln Phe Leu Lys Leu Lys Pro Thr Ile Val Ile Gly Ile Gly Gly  
85 90 95

Gly Ser Ala Leu Asp Thr Gly Lys Gly Ile Arg Phe Phe Gly Glu Lys  
100 105 110

Leu Gly Lys Cys Lys Ile Asn Glu Tyr Ile Ala Ile Pro Thr Thr Ser  
115 120 125

Gly Thr Gly Ser Glu Val Thr Asn Thr Ala Val Ile Ser Asp Thr Lys  
130 135 140

Glu His Arg Lys Ile Pro Ile Leu Glu Asp Tyr Leu Thr Pro Asp Cys  
145 150 155 160

Ala Leu Leu Asp Pro Lys Leu Val Met Thr Ala Pro Lys Ser Val Thr  
165 170 175

Ala Tyr Ser Gly Met Asp Val Leu Thr His Ala Leu Glu Ser Leu Val  
180 185 190

Ala Lys Asp Ala Asn Leu Phe Thr Val Ala Leu Ser Glu Glu Ala Ile  
195 200 205

Asp Ala Val Ile Lys His Leu Val Glu Cys Tyr Arg His Gly Asp Asn  
210 215 220

Val Asp Ala Arg Lys Ile Val His Glu Ala Ser Asn Ile Ala Gly Thr

225                      230                      235                      240

Ala Phe Asn Ile Ala Gly Leu Gly Ile Cys His Ser Ile Ala His Gln  
245                      250                      255

Leu Gly Ala Asn Phe His Val Pro His Gly Leu Ala Asn Thr Met Leu  
260                      265                      270

Leu Pro Tyr Val Ile Ala Tyr Asn Ala Glu His Ser Glu Glu Ala Leu  
275                      280                      285

His Lys Phe Ala Ile Ala Ala Lys Lys Ala Gly Ile Ala Ala Pro Gly  
290                      295                      300

Val Gly Asp Arg Leu Ala Val Lys Arg Leu Ile Ala Lys Ile Arg Glu  
305                      310                      315                      320

Met Ala Arg Gln Met Asn Cys Pro Met Thr Leu Gln Ala Phe Gly Val  
325                      330                      335

Asp Pro Ala Lys Ala Glu Glu Leu Ala Asp Thr Val Val Ala Asn Ala  
340                      345                      350

Lys Lys Asp Ala Thr Phe Pro Gly Asn Pro Val Val Pro Ser Asp Asn  
355                      360                      365

Asp Leu Lys Met Val Tyr Glu Ala Ile Ile Arg  
370                      375

<210> 14  
<211> 1140  
<212> DNA  
<213> Lactobacillus reuteri

<400> 14  
atgggaggca taattccaat ggaaaaatat agtatgccaa ccgggattta ttcgggaaca 60  
gatagtttga aagaactaga gacacttaat aatgaacgta ttttattagt ctgtgattct 120  
ttcttgctg gtagtgatac cttaaaagaa attgagagtc acattaagga taataataag 180

tgtgaaattt tctctgatgt tgtcccgat cctccactag ataagattat ggaaggggtt 240  
 caacaattcc ttaaacttaa accaacaatt gtgattgta tcggtggcgg atcagctttg 300  
 gatactggta aggaattcg tttctttggt gaaaagttgg gcaagtcaa gatcaatgaa 360  
 tatattgcta ttccaacaac gagtggtact ggttcagaag ttacgaatac tgcggttatt 420  
 tctgatacga aagaacatcg taaaattcct attttggaag attatttgac acctgattgt 480  
 gctttactag atcctaaact agttatgact gctcctaaga gtgtaactgc atattcagga 540  
 atggatgttt taacacatgc acttgaatct ttggttgcta aggatgcaaa tttattcaca 600  
 gttgcattat cagaagaagc aattgatgcc gttattaaac atttagttga gtgttatcgt 660  
 cacggcgata atgtggatgc tcgtaagatt gttcatgaag catcaaatac tgccggaact 720  
 gcatttaata ttgctggatt agggatttgc cactcaattg cgcatcaatt gggagctaata 780  
 ttccacgttc cccatggttt agcaaataca atgctcttgc catatggtat cgcatataat 840  
 gctgaacata gtgaagaggc attgcataag ttgcaattg ctgctaagaa agctggaatt 900  
 gctgctcctg gagtaggcga tcgtcttgca gtaaagcgac taattgctaa aattagggaa 960  
 atggcacgac aatgaattg tccaatgact cttcaagcat tcggtgttga tcctgctaaa 1020  
 gctgaagaat tagctgatac tgttggttga aatgcgaaga aagatgcaac attccctggc 1080  
 aatccagttg ttccctcaga taatgatctg aagatggttt acgaagcaat aattcgttaa 1140

<210> 15  
 <211> 379  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 15

Met Gly Gly Ile Met Pro Met Glu Lys Phe Ser Met Pro Thr Arg Ile  
 1 5 10 15

Tyr Ser Gly Thr Asp Ser Leu Lys Glu Leu Glu Thr Leu His Asn Glu  
 20 25 30

Arg Ile Leu Leu Val Cys Asp Ser Phe Leu Pro Gly Ser Asp Thr Leu

35	40	45
Lys Glu Ile Glu Ser His Ile Asn Asp Ser Asn Lys Cys Glu Ile Phe		
50	55	60
Ser Asp Val Val Pro Asp Pro Pro Leu Asp Lys Ile Met Glu Gly Val		
65	70	75 80
Gln Gln Phe Leu Lys Leu Lys Pro Thr Ile Val Ile Gly Ile Gly Gly		
	85	90 95
Gly Ser Ala Met Asp Thr Gly Lys Gly Ile Arg Phe Phe Gly Glu Lys		
	100	105 110
Leu Gly Lys Cys Lys Ile Asn Glu Tyr Ile Ala Ile Pro Thr Thr Ser		
	115	120 125
Gly Thr Gly Ser Glu Val Thr Asn Thr Ala Val Ile Ser Asp Thr Lys		
	130	135 140
Glu His Arg Lys Ile Pro Ile Leu Glu Asp Tyr Leu Thr Pro Asp Cys		
145	150	155 160
Ala Leu Leu Asp Pro Lys Leu Val Met Thr Ala Pro Lys Ser Val Thr		
	165	170 175
Ala Tyr Ser Gly Met Asp Val Leu Thr His Ala Leu Glu Ser Leu Val		
	180	185 190
Ala Lys Asp Ala Asn Leu Phe Thr Val Ala Leu Ser Glu Glu Ala Ile		
	195	200 205
Asp Ala Val Thr Lys Tyr Leu Val Glu Cys Tyr Arg His Gly Asp Asn		
210	215	220
Val Asp Ala Arg Lys Ile Val His Glu Ala Ser Asn Ile Ala Gly Thr		
225	230	235 240

Ala Phe Asn Ile Ala Gly Leu Gly Ile Cys His Ser Ile Ala His Gln  
245 250 255

Leu Gly Ala Asn Phe His Val Pro His Gly Leu Ala Asn Thr Met Leu  
260 265 270

Leu Pro Tyr Val Val Ala Tyr Asn Ala Glu His Cys Glu Glu Ala Leu  
275 280 285

His Lys Phe Ala Ile Ala Ala Lys Lys Ala Gly Ile Ala Ala Pro Gly  
290 295 300

Val Gly Asp Arg Leu Ala Val Lys Arg Leu Ile Ala Lys Ile Arg Glu  
305 310 315 320

Met Ala Arg Gln Met Asn Cys Pro Met Thr Leu Gln Ala Phe Gly Val  
325 330 335

Asp His Ala Lys Ala Glu Ala Ala Ala Asp Thr Val Val Ala Asn Ala  
340 345 350

Lys Lys Asp Ala Thr Phe Pro Gly Asn Pro Val Val Pro Ser Asp Asp  
355 360 365

Asp Leu Lys Met Ile Tyr Glu Ala Ile Ile Arg  
370 375

<210> 16  
<211> 1140  
<212> DNA  
<213> Lactobacillus reuteri

<400> 16  
atgggaggca taatgccgat ggaaaaattt agtatgccaa cccgaattta ttcgggaaca 60  
gatagtttga aggaattaga aacccttcat aatgaacgaa ttttgtagt ttgtgactca 120  
ttcttacctg gtagtgacac attaaaggaa attgagagtc atattaacga cagtaataaa 180  
tgtgaaattt tctctgatgt tgtccctgat ccaccactag ataaaattat ggaaggggtt 240

caacagttct taaagctgaa accaacaatt gtaattggta tcggtggtgg ttctgcaatg 300  
 gacaccggta aggaattcgt tttcttcggt gaaaagcttg gcaagtgcaa aattaatgaa 360  
 tatattgcaa ttccaacaac cagcggaacc ggttcagaag ttactaatac tgcggttatt 420  
 tctgatacta aggaacaccg gaagattccg attcttgaag attacttaac accagattgt 480  
 gcattgcttg atcctaagtt agtaatgaca gcaccaaaga gtgttactgc ctactcagga 540  
 atggatgtat taactcatgc tcttgaatca ttggttgcta aggacgctaa tttgtttacc 600  
 gttgcattat cagaagaagc cattgatgcg gtaactaagt atcttgttga atgttatcgt 660  
 catggcgata atgtcgatgc acgaaagatc gttcacgaag catcaaatac tgccggaaca 720  
 gcctttaaca ttgctggact aggtatttgc cactcaattg cccaccaatt aggtgctaac 780  
 ttccatgttc ctcatggttt agcaaacaca atgttattgc catatgttgt tgcatacaat 840  
 gctgaacact gtgaagaagc cttacacaag ttgcaattg ccgctaagaa agccggaatt 900  
 gctgcacctg gcgttggatg ccgtttggct gtaagcggc tgattgcaaa gattcgtgaa 960  
 atggcacggc aatgaattg tccaatgact ctccaagcat ttggagtga ccacgcaaaa 1020  
 gcagaagcag ctgctgatac ggttgttgct aatgcgaaga aggatgcaac attcccaggc 1080  
 aatccagttg ttccttcaga tgatgatctg aagatgattt acgaagcaat aattcgtaa 1140

<210> 17  
 <211> 390  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 17

Met Asn Arg Gln Phe Asp Phe Leu Met Pro Ser Val Asn Phe Phe Gly  
 1 5 10 15

Pro Gly Val Ile Ala Lys Ile Gly Asp Arg Ala Lys Met Leu Asn Met  
 20 25 30

His Lys Pro Leu Ile Val Thr Thr Glu Gly Leu Ser Lys Ile Asp Asn  
 35 40 45

Gly Pro Val Lys Gln Thr Val Ala Ser Leu Glu Lys Ala Gly Val Asp  
50 55 60

Tyr Ala Val Phe Thr Gly Ala Glu Pro Asn Pro Lys Ile Arg Asn Val  
65 70 75 80

Gln Ala Gly Lys Lys Met Tyr Gln Asp Glu Asn Cys Asp Ser Ile Ile  
85 90 95

Thr Val Gly Gly Gly Ser Ala His Asp Cys Gly Lys Gly Ile Gly Ile  
100 105 110

Val Leu Thr Asn Gly Asp Asp Ile Ser Lys Leu Ala Gly Ile Glu Thr  
115 120 125

Leu Lys Asn Pro Leu Pro Pro Leu Met Ala Val Asn Thr Thr Ala Gly  
130 135 140

Thr Gly Ser Glu Leu Thr Arg His Ala Val Ile Thr Asn Glu Lys Thr  
145 150 155 160

His Leu Lys Phe Val Val Val Ser Trp Arg Asn Ile Pro Leu Val Ser  
165 170 175

Phe Asn Asp Pro Met Leu Met Leu Asp Ile Pro Lys Asp Ile Thr Ala  
180 185 190

Ala Thr Gly Cys Asp Ala Phe Val Gln Ala Ile Glu Pro Tyr Val Ser  
195 200 205

Val Asp His Asn Pro Ile Thr Asp Ser Gln Cys Lys Glu Ala Ile Gln  
210 215 220

Leu Ile Gln Thr Ala Leu Pro Glu Val Val Ala Asn Gly His Asn Ile  
225 230 235 240

Glu Ala Arg Thr Lys Met Val Glu Ala Glu Met Leu Ala Gly Met Ala

245	250	255
Phe Asn Asn Ala Asn Leu Gly Tyr Val His Ala Met Ala His Gln Leu		
260	265	270
Gly Gly Gln Tyr Asp Ala Pro His Gly Val Cys Cys Ala Leu Leu Leu		
275	280	285
Thr Thr Val Glu Glu Tyr Asn Leu Ile Ala Cys Pro Glu Arg Phe Ala		
290	295	300
Glu Leu Ala Lys Val Met Gly Phe Asp Thr Thr Gly Leu Thr Leu Tyr		
305	310	315
		320
Glu Ala Ala Gln Lys Ser Ile Asp Gly Met Arg Glu Met Cys Arg Leu		
325	330	335
Val Gly Ile Pro Ser Ser Ile Lys Glu Ile Gly Ala Lys Pro Glu Asp		
340	345	350
Phe Glu Met Met Ala Lys Asn Ala Leu Lys Asp Gly Asn Ala Phe Ser		
355	360	365
Asn Pro Arg Lys Gly Thr Val Glu Asp Ile Val Lys Leu Tyr Gln Lys		
370	375	380
Ala Tyr Asp Gly Ile Tyr		
385	390	

<210> 18  
 <211> 1173  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 18	
atgaatagac aatttgattt cttaatgcc aagtgaact tctttgtcc tgggttatt	60
gctaaaattg gtgatcgtgc aaagatgctc aatatgcaca aaccattgat tgttactact	120
gaaggtttat ccaagattga caatggtcct gtaaagcaaa ccgttgcttc attggaaaag	180



gctggcgttg actatgccgt atttactggc gctgaacctt accctaagat ccggaatggt 240  
 caagctggta aaaagatgta ccaagatgaa aactgtgact caattattac tgttgggtggg 300  
 ggttctgctc acgactgtgg taagggtatc ggtattgttt taactaacgg tgatgacatt 360  
 tccaagcttg ccggaattga aacattgaag aatccacttc caccattgat ggctgttaac 420  
 actactgccg gaactgggtc tgaattaact cgtcacgctg ttattactaa cgaaaagact 480  
 catttgaagt ttgttgttgt ttcattggcg aacattccat tggatcatt caacgatcca 540  
 atgttgatgc ttgatattcc aaaagacatt accgctgcta ctggttgtga tgcttttgtt 600  
 caggctattg aaccatacgt ttctgttgac cataacccaa ttactgatag tcaatgtaaa 660  
 gaagctattc aattaattca aactgcttta ccagaagtag ttgctaattg tcacaatatt 720  
 gaagcacgga ctaagatggt tgaagctgaa atgcttgccg gaatggcctt caataatgcc 780  
 aacttaggct atgttcacgc aatggctcac caactcgggt gtcaatatga tgctcctcat 840  
 ggtgtttgct gtgccttgct ctgaccact gttgaagaat ataacttaac cgcatgtcca 900  
 gagcggtttg ctgaattggc taaggtaatg ggctttgaca ctactggtct taccctttac 960  
 gaagcagcac aaaagtcaat tgacgggtatg cgtgaaatgt gccggccttg ttgtattcca 1020  
 tcatcaatca aggaaatigg tgctaagcca gaagactttg aaatgatggc caagaatgcc 1080  
 ctcaaggatg gtaatgcctt ctctaaccac cgtgaaggta ctgttgaaga tattgtaaag 1140  
 ctttatcaaa aggccttacg tggcatctac taa 1173

<210> 19  
 <211> 616  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 19

Met Ala Thr Glu Lys Val Ile Gly Val Asp Ile Gly Asn Ser Ser Thr  
 1 5 10 15

Glu Val Ala Leu Ala Asp Val Ser Asp Ser Gly Gln Val His Phe Ile  
 20 25 30

Asn Ser Gly Ile Ala Pro Thr Thr Gly Ile Lys Gly Thr Lys Gln Asn  
35 40 45

Leu Val Gly Ile Arg Asp Ser Ile Thr Gln Val Leu Asn Lys Ser Asn  
50 55 60

Leu Thr Ile Asp Asp Ile Asp Leu Ile Arg Ile Asn Glu Ala Thr Pro  
65 70 75 80

Val Ile Gly Asp Val Ala Met Glu Thr Ile Thr Glu Thr Val Val Thr  
85 90 95

Glu Ser Thr Met Ile Gly His Asn Pro Asn Thr Pro Gly Gly Ile Gly  
100 105 110

Thr Gly Ala Gly Ile Thr Val Arg Leu Leu Asp Leu Leu Lys Lys Thr  
115 120 125

Asp Lys Ser Lys Asn Tyr Ile Val Val Val Pro Lys Asp Ile Asp Phe  
130 135 140

Glu Asp Val Ala Lys Leu Ile Asn Ala Tyr Val Ala Ser Gly Tyr Lys  
145 150 155 160

Ile Thr Ala Ala Ile Leu Arg Asn Asp Asp Gly Val Leu Val Asp Asn  
165 170 175

Arg Leu Asn His Lys Ile Pro Ile Val Asp Glu Val Ala Met Ile Asp  
180 185 190

Lys Val Pro Leu Asn Met Leu Ala Ala Val Glu Val Ala Gly Pro Gly  
195 200 205

Gln Val Ile Ser Gln Leu Ser Asn Pro Tyr Gly Ile Ala Thr Leu Phe  
210 215 220

Gly Leu Thr Pro Glu Glu Thr Lys Asn Ile Val Pro Val Ser Arg Ala

225	230	235	240
Leu Ile Gly Asn Arg Ser Ala Val Val Ile Lys Thr Pro Ala Gly Asp	245	250	255
Val Lys Ala Arg Val Ile Pro Ala Gly Lys Ile Ile Ile Asn Gly Asp	260	265	270
Thr Gly Lys Glu Glu Val Gly Val Ser Glu Gly Ala Asp Ala Ile Met	275	280	285
Lys Lys Val Ser Ser Phe Arg His Ile Asn Asn Ile Thr Gly Glu Ser	290	295	300
Gly Thr Asn Val Gly Gly Met Leu Glu Asn Val Arg Gln Thr Met Ala	305	310	315
Asp Leu Thr Gly Lys Lys Asn Asp Glu Ile Ala Ile Gln Asp Leu Leu	325	330	335
Ala Val Asp Thr Gln Val Pro Val Glu Val Arg Gly Gly Leu Ala Gly	340	345	350
Glu Phe Ser Asn Glu Ser Ala Val Gly Ile Ala Ala Met Val Lys Ser	355	360	365
Asp His Leu Gln Met Glu Val Ile Ala Lys Leu Ile Glu Lys Glu Phe	370	375	380
Asn Thr Lys Val Glu Ile Gly Gly Ala Glu Val Glu Ser Ala Ile Arg	385	390	395
Gly Ala Leu Thr Thr Pro Gly Thr Asp Lys Pro Ile Ala Ile Leu Asp	405	410	415
Leu Gly Ala Gly Ser Thr Asp Ala Ser Ile Ile Asn Lys Glu Asn Asn	420	425	430

Thr Val Ala Ile His Leu Ala Gly Ala Gly Asp Met Val Thr Met Ile  
435 440 445

Ile Asn Ser Glu Leu Gly Leu Asn Asp Ile His Leu Ala Glu Asp Ile  
450 455 460

Lys Arg Tyr Pro Leu Ala Lys Val Glu Asn Leu Phe Gln Ile Arg His  
465 470 475 480

Glu Asp Gly Ser Val Gln Phe Phe Lys Asp Pro Leu Pro Ser Ser Leu  
485 490 495

Phe Ala Lys Val Val Val Ile Lys Pro Asp Gly Tyr Glu Pro Val Thr  
500 505 510

Gly Asn Pro Ser Ile Glu Lys Ile Lys Leu Val Arg Gln Ser Ala Lys  
515 520 525

Lys Arg Val Phe Val Thr Asn Ala Leu Arg Ala Leu Lys Tyr Val Ser  
530 535 540

Pro Thr Gly Asn Ile Arg Asp Ile Pro Phe Val Val Ile Val Gly Gly  
545 550 555 560

Ser Ala Leu Asp Phe Glu Ile Pro Gln Leu Val Thr Asp Glu Leu Ala  
565 570 575

His Phe Asn Leu Val Ala Gly Arg Gly Asn Val Arg Gly Val Glu Gly  
580 585 590

Pro Arg Asn Ala Val Ala Thr Gly Leu Ile Leu Arg Tyr Gly Glu Glu  
595 600 605

Arg Arg Lys Arg Tyr Glu Gln Arg  
610 615

<210> 20

<211> 1851  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 20

atggcaactg aaaaagtaat tgggtgtgat attgggaatt cttccactga agttgcattg	60
gcagatgtaa gcgatatgg gcaagttcac tttattaact ctggtattgc tcctactact	120
gggattaaag gtactaagca gaatctagtt ggaattaggg attcaattac tcaagttctg	180
aataaatcta atctgacaat cgatgatatt gatttaattc gaatcaatga agccacgcca	240
gtaattgggtg atgttgcaat ggaaactatt acagaaacag ttgtaacaga atcaacaatg	300
attgggcata atcctaatac accaggtggt ataggaacag gggctgggat aacagttcgt	360
ttgcttgatc tcttaaagaa aactgataaa agcaaaaatt atattgttgt agttcctaag	420
gatattgatt ttgaagacgt tgctaaactt atcaatgctt atgttgctc tggttataaa	480
ataacagcag caattctaag aaacgatgat ggtgttttag ttgataatcg gttaaactcat	540
aaaattccga ttgtcgatga agttgctatg attgacaaag ttccgttaaa tatgctggca	600
gctgtagaag ttgctggccc tggacaagta atttcacaac tttcaaaccg gtatggtatc	660
gctaccttat ttggactaac tccagaagag actaagaata ttgttccagt ttctcgagcg	720
cttattggaa atcgttcggc tgttgttatt aagactccag ctggggatgt taaagcgga	780
gtaattccag caggtaaaat cataattaat ggtgatactg gaaaagaaga agttggagtt	840
tctgaagggtg ctgacgccat tatgaaaaag gtttctagtt tccgccatat taacaatata	900
actggtgagt ctggaaccaa tgttggagga atgttggaaa atgttcgtca aacaatggca	960
gatcttacag gaaagaaaaa tgatgaaatt gctattcaag atttacttgc tgttgatact	1020
caagtaccag ttgaagttcg aggcggtcta gctggtgaat tctcaaatga atcagcagtt	1080
gggatcgcag caatggttaa gtcagatcat cttcaaatgg aagttattgc taaacttatt	1140
gaaaaagaat ttaatacaaa ggttgaaatt ggtggtgctg aagtigaatc tgcaattcgt	1200
ggagcattaa caactccagg aacagataag ccaatcgcaa tccttgattt aggtgctggc	1260
tcaacagatg cttcaatcat taataaagaa aataatacag ttgcaattca cttagctggt	1320
gctggtgata tggtaacgat gattattaat tctgaattag gattgaatga tattcatctt	1380

gcagaagaca tcaaacgcta cccattagca aaggtagaaa acctttttca aattcgacat 1440  
gaggatggtt cggttcaatt ctttaaagat ccgcttccat catcactgtt tgccaaagtt 1500  
gtagtaatta aaccagatgg atacgaacca gtaactggga atccaagcat tgaaaaaatt 1560  
aaattagtgc gtcaaagtgc aaagaaacga gtatttgta cgaacgcttt acgggcactt 1620  
aagtatgtta gtccaactgg aaatattcgt gatattccgt ttgttgtaat tgtcgggtgt 1680  
tcagccttag actttgaaat tccacaactt gttacagatg aattagcaca ctttaattta 1740  
gttgctggtc gaggaaatgt tcgtggagtt gaaggaccac gaaatgccgt tgcaactgga 1800  
ttgattttaa ggtatggcga agaaagaagg aagcgttatg aacaacgatg a 1851

<210> 21  
<211> 615  
<212> PRT  
<213> Lactobacillus reuteri

<400> 21

Met Ala Thr Glu Lys Val Ile Gly Val Asp Ile Gly Asn Ser Ser Thr  
1 5 10 15

Glu Val Ala Leu Ala Asp Val Ala Asp Asn Gly Thr Ile Asn Phe Ile  
20 25 30

Gly Ser Gly Ile Ala Pro Thr Thr Gly Ile Lys Gly Thr Lys Gln Asn  
35 40 45

Leu Val Gly Ile Arg Asp Ser Ile Asn Gln Val Leu Asn Lys Ala Asn  
50 55 60

Leu Thr Ile Asn Asp Ile Asp Leu Ile Arg Ile Asn Glu Ala Thr Pro  
65 70 75 80

Val Ile Gly Asp Val Ala Met Glu Thr Ile Thr Glu Thr Val Val Thr  
85 90 95

Glu Ser Thr Met Ile Gly His Asn Pro Asp Thr Pro Gly Gly Ile Gly

100	105	110
Thr Gly Ala Gly Ile Thr Val	Arg Leu Leu Asp Leu Val	Lys Lys Thr
115	120	125
Asp Lys Ser Gln Asn Tyr Ile Val Val Val Pro Lys Asp Ile Asp Phe		
130	135	140
Glu Asp Val Ala Lys Leu Ile Asn Ala Tyr Val Ala Ser Gly Tyr Lys		
145	150	155 160
Ile Thr Ala Ala Ile Leu Lys Asn Asp Asp Gly Val Leu Val Asp Asn		
165	170	175
Arg Leu Asn Lys Pro Ile Pro Ile Val Asp Glu Val Ala Met Ile Asp		
180	185	190
Lys Val Pro Leu Asn Met Leu Ala Ala Val Glu Val Ala Gly Ser Gly		
195	200	205
Gln Val Ile Ser Gln Leu Ser Asn Pro Tyr Gly Ile Ala Thr Leu Phe		
210	215	220
Gly Leu Asn Pro Glu Glu Thr Lys Asn Ile Val Pro Val Ser Arg Ala		
225	230	235 240
Leu Ile Gly Asn Arg Ser Ala Val Val Ile Lys Thr Pro Ala Gly Asp		
245	250	255
Val Lys Ala Arg Val Ile Pro Ala Gly Asn Ile Ile Ile Asn Ser Asp		
260	265	270
Thr Gly Lys Glu Glu Val Gly Val Ser Glu Gly Ala Asp Ala Ile Met		
275	280	285
Lys Lys Val Ser Ser Phe Arg His Ile Asn Asp Ile Thr Gly Glu Ser		
290	295	300

Gly Thr Asn Val Gly Gly Met Leu Glu Asn Val Arg Gln Thr Met Ala  
305 310 315 320

Asp Leu Thr Gly Lys Lys Asn Ser Glu Ile Ala Ile Gln Asp Leu Leu  
325 330 335

Ala Val Asp Thr Gln Val Pro Val Glu Val Arg Gly Gly Leu Ala Gly  
340 345 350

Glu Phe Ser Asn Glu Ser Ala Val Gly Ile Ala Ala Met Val Lys Ser  
355 360 365

Asp His Leu Gln Met Glu Val Ile Ala Lys Leu Ile Glu Asp Glu Phe  
370 375 380

His Thr Lys Val Glu Ile Gly Gly Ala Glu Val Glu Ser Ala Ile Arg  
385 390 395 400

Gly Ala Leu Thr Thr Pro Gly Thr Asp Lys Pro Ile Ala Ile Leu Asp  
405 410 415

Leu Gly Ala Gly Ser Thr Asp Ala Ser Ile Ile Asn Lys Glu Asn Gln  
420 425 430

Thr Val Ala Ile His Leu Ala Gly Ala Gly Asp Met Val Thr Met Ile  
435 440 445

Ile Asn Ser Glu Leu Gly Leu Asn Asp Ile His Leu Ala Glu Asp Ile  
450 455 460

Lys Arg Tyr Pro Leu Ala Lys Val Glu Asn Leu Phe Gln Ile Arg His  
465 470 475 480

Glu Asp Gly Ser Val Gln Phe Phe Glu Asp Pro Leu Pro Ser Ser Leu  
485 490 495

Phe Ala Arg Val Val Val Ile Lys Pro Asp Gly Tyr Glu Pro Val Thr



500	505	510
Gly Asn Pro Ser Ile Glu Lys	Ile Lys Leu Val Arg Gln Ser Ala Lys	
515	520	525
Lys Arg Val Phe Val Thr Asn Ala Leu Arg Ala Leu Lys Tyr Val Ser		
530	535	540
Pro Thr Gly Asn Ile Arg Asp Ile Pro Phe Val Val Ile Val Gly Gly		
545	550	555 560
Ser Ala Leu Asp Phe Glu Ile Pro Gln Leu Val Thr Asp Glu Leu Ala		
565	570	575
His Phe Asn Leu Val Ala Gly Arg Gly Asn Val Arg Gly Val Glu Gly		
580	585	590
Pro Arg Asn Ala Val Ala Thr Gly Leu Ile Leu Arg Tyr Gly Glu Glu		
595	600	605
Arg Arg Lys Gln Tyr Glu Gln		
610	615	

<210> 22  
 <211> 1848  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 22	
atggcaactg aaaaagtaat tgggtgtgat attggttaatt cttccactga agtagcgta	60
gctgatgttg ctgataatgg aacaattaac ttatttggct ctggaatagc ccctactact	120
ggtatcaagg gtacaaaaca aaatctggtt ggaattagag attccatcaa tcaagtcctt	180
aataaggcta atttaacgat taatgatatt gatttaattc ggattaatga ggcaacgcca	240
gttatcgggtg acgtacgat ggaaacaatt accgaaacgg tcgtaaccga atcgactatg	300
atcggacata atcctgatac tcccggtggt attggaactg gtgcaggaat aacagttaga	360
ctattggatc ttgtcaaaaa gacggataaa agtcaaaact atattgttgt tgttccaag	420

gatattgatt ttgaagatgt tgctaaactg attaacgcct atgttgcttc gggctataag	480
attacagctg cgatcctaaa aatgatgat ggtgtgttag ttgataatcg attgaataaa	540
ccaattccga ttgttgatga agttgccatg attgataaag tcccattaaa tatgctggcg	600
gcagttgaag ttgctggttc gggacaagtt atctcgcaac tttcaaatcc atatggaatt	660
gctaccttgt ttggattgaa tccagaagaa accaagaata ttgttcctgt ctcaactgca	720
cttattggta accgttctgc cgttgtcatt aagacaccag caggggatgt taaggcacgg	780
gtaattccag ccggaacat tatcattaac agcgataccg gaaaagaaga agttggtgtt	840
tcagaagggt ctgacgcat tatgaagaaa gtttccagtt tccgtcacat taatgatatt	900
actggagaat cagggaactaa cgttggtgga atgcttgaaa atgttcgcca aacaatggct	960
gatttaactg gaaagaagaa tagtgaaatt gctattcaag atctattagc ggtagataca	1020
cagggtgcctg tcgaagtgc cgggggcttg gctggtgaat tttcaaatga atcagcagtt	1080
ggtattgctg cgatggtaa gtctgatcat ctcaaatgg aagtaattgc taaattaatt	1140
gaggatgaat tccatacgaa ggttgagatt ggtggtgccg aagttgaatc tgcaattcgc	1200
ggtgcattaa cgacaccggg aacagataaa ccaattgcaa ttcttgattt aggtgccggc	1260
tcaacagatg cttcaattat caataaagaa aatcaaactg tagcaattca cttagctggt	1320
gctggtgaca tggttacgat gattattaac tctgaattgg gattaaatga cattcaattg	1380
gcagaggata ttaagcgcta tccattagct aaagtcgaaa atctattcca aattogtcat	1440
gaagatggat cggtaacaatt ctttgaagat ccgcttccgt catcattatt tgctcgtgtt	1500
gttgtaatca aaccagatgg gtatgaaccg gttacgggta atccaagcat tgagaagatc	1560
aagctggttc gtcaaagtgc taagaagcgg gtatttgtaa ccaatgcatt acgagctctt	1620
aagtacgtca gcccgacagg aaacattcgt gatattccgt ttgttgtaat tgcgggtgga	1680
tctgctcttg actttgaaat accacaactg gtaacagatg agttagcaca ctttaactta	1740
gttgccggac gtgggaatgt tcgtggagta gaaggccac gaaacgcggt tgcaacagga	1800
ttaattctcc gttatggcga agaaagaaga aagcaatatg aacaatga	1848

<210> 23  
 <211> 119  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 23

Met Asn Asn Asp Asp Ser Gln Arg Pro Ser Ile Val Val Gly Leu Glu  
 1 5 10 15

Asn Gly Ile Thr Ile Pro Asp Ser Val Lys Pro Leu Phe Tyr Gly Ile  
 20 25 30

Glu Glu Glu Gln Ile Pro Val Ser Val Arg Lys Ile Asn Ile Asn Asp  
 35 40 45

Thr Val Glu Arg Ala Tyr Gln Ser Ala Leu Ala Ser Arg Leu Ser Val  
 50 55 60

Gly Ile Ala Phe Glu Gly Asp His Phe Ile Val His Tyr Lys Asn Leu  
 65 70 75 80

Lys Glu Asn Gln Pro Leu Phe Asp Met Thr Ile Asn Asp Lys Lys Gln  
 85 90 95

Leu Arg Ile Leu Gly Ala Asn Ala Ala Arg Leu Val Lys Gly Ile Pro  
 100 105 110

Phe Lys Glu Met Ala Asn Arg  
 115

<210> 24  
 <211> 360  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 24

atgaacaacg atgattcaca acgtccctcg attgtcgtcg gactagaaaa tggaataacg 60

attccagata gtgtcaagcc acttttttat ggaattgaag aagaacagat cccagtctca 120

gttcgtaaaa tcaatataaa tgatactggt gaaagagcat accaatcagc tcttgcac 180

aggctatctg taggaattgc ttttgaagga gatcatttta ttgttcacta taagaactta 240  
aaagaaaaac agcctttatt tgatatgaca atcaatgata aaaagcaatt acgaatttta 300  
ggagcaaatg cagcgagatt agtaaaagga atccctttta aggaaatggc aaacaggtga 360

<210> 25  
<211> 118  
<212> PRT  
<213> Lactobacillus reuteri

<400> 25

Met Asn Asn Asp Ser Glu Arg Pro Ser Ile Ile Val Gly Val Glu Asn  
1 5 10 15

Gly Thr Ala Ile Pro Gln Asn Ala Ala Pro Leu Phe Asn Gly Ile Glu  
20 25 30

Glu Glu Gln Ile Pro Val Ala Val Arg Glu Ile Asp Ile Asp Asn Val  
35 40 45

Leu Ser Arg Ala Tyr Gln Ser Ala Leu Ala Ser Arg Leu Ser Val Gly  
50 55 60

Ile Ala Phe Asp Gly Asp Arg Phe Ile Val His Tyr Lys Asn Leu Lys  
65 70 75 80

Glu Asn Lys Pro Leu Phe Asp Lys Thr Ile Ser Asp Gly Lys Gln Leu  
85 90 95

Arg Val Leu Gly Ala Asn Ala Ala Arg Leu Val Lys Gly Ile Pro Phe  
100 105 110

Lys Glu Met Val Asn Arg  
115

<210> 26  
<211> 357  
<212> DNA

<213> *Lactobacillus reuteri*

<400> 26

atgaacaatg attcagagcg tccctcaatt atcgtagtg ttgagaatgg aacagctatt 60  
cctcaaatg cagcaccgct ttttaacgga attgaagaag aacaaatacc ggtggcggtt 120  
agagaaatcg acattgataa tgttttaagt cgggcatacc agtcggccct cgcctcacga 180  
ttatcagtag ggattgcttt tgatggtgat cgatttatcg ttactataa aaacttaaaa 240  
gaaaacaaac cactatttga taaaacaatt agtgatggta agcaactacg agttctagga 300  
gcaaatgcag cgcgactagt aaaggaatc cctttaagg aaatggtaaa caggtga 357

<210> 27

<211> 37

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 27

atgaaacgtc aaaaacgatt tgaagaacta gaaaaac 37

<210> 28

<211> 32

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 28

ttagttatcg ccttttagct tottacgact tt 32

<210> 29

<211> 30

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 29

atgaaacgtc aaaaacgttt tgaagaacta 30

<210> 30  
<211> 25  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 30  
ctagttatca cccttgagct tcttt

25

<210> 31  
<211> 29  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 31  
atgggaggca taattccaat ggaaaaata

29

<210> 32  
<211> 31  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 32  
ttaacgaatt attgcttcgt aaaccatctt c

31

<210> 33  
<211> 21  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 33  
atgggaggca taatgcgat g

21

<210> 34  
<211> 31  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 34  
ttaacgaatt attgcttcgt aaatcatott c

31

<210> 35  
<211> 32  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 35  
atgaatagac aatttgattt cttaatgcca ag

32

<210> 36  
<211> 26  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 36  
ttagtagatg ccacgtaag cctttt

26

<210> 37  
<211> 33  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 37  
atggcaactg aaaaagtaat tgggtgtgat att

33

<210> 38  
<211> 31

<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 38  
tcacctgttt gccatttcct taaaaggat t 31

<210> 39  
<211> 28  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 39  
atggcaactg aaaaagtaat tgggtgtg 28

<210> 40  
<211> 26  
<212> DNA  
<213> Artificial

<220>  
<223> primer

<400> 40  
tcacctgttt accatttcct taaagg 26

<210> 41  
<211> 477  
<212> PRT  
<213> Lactobacillus reuteri

<400> 41

Met Gln Ile Asn Asp Ile Glu Ser Ala Val Arg Lys Ile Leu Ala Glu  
1 5 10 15

Glu Leu Asp Asn Ala Ser Ser Ser Ser Ala Asn Val Ala Ala Thr Thr  
20 25 30

Asp Asn Gly His Arg Gly Ile Phe Thr Asn Val Asn Asp Ala Ile Ala



35	40	45
Ala Ala Lys Ala Ala Gln Glu Ile Tyr Arg Asp Lys Pro Ile Ala Val		
50	55	60
Arg Gln Gln Val Ile Asp Ala Ile Lys Glu Gly Phe Arg Pro Tyr Ile		
65	70	75 80
Glu Lys Met Ala Lys Asp Ile Lys Glu Glu Thr Gly Met Gly Thr Val		
85	90	95
Glu Ala Lys Ile Ala Lys Leu Asn Asn Ala Leu Tyr Asn Thr Pro Gly		
100	105	110
Pro Glu Ile Leu Glu Pro Val Val Glu Asn Gly Asp Gly Gly Met Val		
115	120	125
Met Tyr Glu Arg Leu Pro Tyr Gly Val Ile Gly Ala Val Gly Pro Ser		
130	135	140
Thr Asn Pro Ser Glu Thr Val Ile Ala Asn Ala Ile Met Met Leu Ala		
145	150	155 160
Gly Gly Asn Thr Leu Tyr Phe Gly Ala His Pro Gly Ala Lys Asn Val		
165	170	175
Thr Arg Trp Thr Ile Glu Lys Met Asn Asp Phe Ile Ala Asp Ala Thr		
180	185	190
Gly Leu His Asn Leu Val Val Ser Ile Glu Thr Pro Thr Ile Glu Ser		
195	200	205
Val Gln Gln Met Met Lys His Pro Asp Ile Ala Met Leu Ala Val Thr		
210	215	220
Gly Gly Pro Ala Val Val His Gln Ala Met Thr Ser Gly Lys Lys Ala		
225	230	235 240

Val Gly Ala Gly Pro Gly Asn Pro Pro Ala Met Val Asp Ala Thr Ala  
245 250 255

Asp Ile Asp Leu Ala Ala His Asn Ile Ile Thr Ser Ala Ser Phe Asp  
260 265 270

Asn Asp Ile Leu Cys Thr Ala Glu Lys Glu Val Val Ala Glu Ser Ser  
275 280 285

Ile Lys Asp Glu Leu Ile Arg Lys Met Gln Asp Glu Gly Ala Phe Val  
290 295 300

Val Asn Arg Glu Gln Ala Asp Lys Leu Ala Asp Met Cys Ile Gln Glu  
305 310 315 320

Asn Gly Ala Pro Asp Arg Lys Phe Val Gly Lys Asp Ala Thr Tyr Ile  
325 330 335

Leu Asp Gln Ala Asn Ile Pro Tyr Thr Gly His Pro Val Glu Ile Ile  
340 345 350

Cys Glu Leu Pro Lys Glu His Pro Leu Val Met Thr Glu Met Leu Met  
355 360 365

Pro Ile Leu Pro Val Val Ser Cys Pro Thr Phe Asp Asp Val Leu Lys  
370 375 380

Thr Ala Val Glu Val Glu Lys Gly Asn His His Thr Ala Thr Ile His  
385 390 395 400

Ser Asn Asn Leu Lys His Ile Asn Asn Ala Ala His Arg Met Gln Cys  
405 410 415

Ser Ile Phe Val Val Asn Gly Pro Ser Tyr Val Gly Thr Gly Val Ala  
420 425 430

Asp Asn Gly Ala His Ser Gly Ala Ser Ala Leu Thr Ile Ala Thr Pro

435

440

445

Thr Gly Glu Gly Thr Cys Thr Ala Arg Thr Phe Thr Arg Arg Val Arg  
 450 455 460

Leu Asn Ser Pro Gln Gly Phe Ser Val Arg Asn Trp Tyr  
 465 470 475

<210> 42  
 <211> 1434  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 42  
 atgcagatta atgatattga aagtgcgtga cgcaaaattc ttgccgaaga actagataat 60  
 gccagctctt caagtgcaaa cgttgcagct actactgata atggatcatc cggaattttc 120  
 actaatgtca atgatgcaat tgctgctgca aaagctgctc aagaaatata tcgggataag 180  
 ccaattgctg ttgcccaaca agtgattgat gccattaagg aaggattccg cccatatatt 240  
 gaaaaaatgg ctaaagatat caaagaagaa acaggaatgg gaacagtaga ggccaaaatt 300  
 gctaagttaa acaatgcctt gtacaacact cctgggtccg agattcttga accagttgta 360  
 gaaaacgggt acggtgggat ggttatgtat gaacggttac catatggtgt tattggtgcg 420  
 gttggcccaa gtacaaaccc ttcagaaact gtaattgcta atgcgatcat gatgcttgcc 480  
 ggtggttaata ctctttactt tgggtgctcac cctggcgcaa agaattgtac tcgctggaca 540  
 attgaaaaga tgaacgattt tattgcagat gcaacaggcc ttcataattt agttgtaagt 600  
 attgaaacac caacaattga atcagttcaa caaatgatga agcaccocga cattgcaatg 660  
 ttagcagtaa ctggtggccc agctgttgtt caccaagcaa tgaccagtgg taagaaagcg 720  
 gttggtgctg gtcttggtta tcctcctgca atggttgatg ctactgctga tattgattta 780  
 gctgctcata atatcattac atctgcttca tttgataatg atattttatg tactgctgaa 840  
 aaggaagtag ttgcagaaag tagcattaaa gatgaattaa ttcgtaagat gcaagatgaa 900  
 ggtgcctttg tagttaaccg tgaacaagcc gataaattag ctgatatgtg tatccaagaa 960  
 aatggtgctc ctgatcgtaa atttgttggt aaggatgcaa cttatatctt agaccaagct 1020

aatattcctt acacaggcca ccagttgaa attatttgtg aacttcctaa ggaacatcca 1080  
 ttagtaatga ctgaaatgtt aatgccaatt ttaccagttg tttcttgtcc aacatttgat 1140  
 gatgttttga agactgctgt tgaagttgaa aaaggttaacc atcacacagc tactattcat 1200  
 tccaataacc ttaagcatat taataatgct gtcaccgga tgcaatgttc aatctttgtt 1260  
 gttaatggcc catcctatgt tggtagaggt gttgcagata atggagctca ctcaggtgct 1320  
 tcagcattaa caattgctac gccaaactggt gaaggaacat gtactgcacg aacatttact 1380  
 cgtcgggttc gtttgaactc accacaagga ttctcagtac gtaactggta ttaa 1434

<210> 43  
 <211> 395  
 <212> PRT  
 <213> Lactobacillus reuteri

<400> 43

Met Met Ser Lys Lys Ile Leu Ala Ile Asn Ser Gly Ser Ser Ser Ile  
 1 5 10 15

Lys Phe Lys Leu Tyr Leu Met Pro Glu Glu Lys Leu Leu Ile Ser Gly  
 20 25 30

Ser Ala Glu Asn Leu Gly Ser Ser Thr Ser Gln Leu Ser Tyr Lys Thr  
 35 40 45

Asp Lys Thr Asn Glu Thr Arg Gln Ile Pro Leu Lys Asn His Ser Glu  
 50 55 60

Ala Ile Asp His Ile Ile Asp Val Leu Met Ser Ser Gly Val Val Lys  
 65 70 75 80

Asp Lys Ser Glu Ile Tyr Gly Val Gly His Arg Ile Ser His Gly Gly  
 85 90 95

Ser Tyr Tyr Thr His Ala Val Ala Val Thr Pro Glu Val Glu Lys Arg  
 100 105 110

Ile Asp Glu Leu Lys Val Leu Ser Pro Leu His Asn Pro Asn Gly Leu  
115 120 125

Ala Gly Ile Lys Ala Phe Glu Lys Phe Leu Pro Asp Ala Lys Glu Val  
130 135 140

Val Thr Phe Asp Asn Ser Phe His His Thr Ile Pro Lys Lys Ala Tyr  
145 150 155 160

Met Tyr Ala Leu Pro Tyr Glu Phe Tyr Glu Lys Tyr Gln Ile Arg Arg  
165 170 175

Tyr Gly Phe His Ala Pro Ser His Gln Tyr Val Ser Glu Lys Ala Arg  
180 185 190

Glu Leu Phe Gly Lys Glu Lys Thr Arg Arg Met Ile Thr Cys His Leu  
195 200 205

Gly Asn Gly Ser Ser Val Ser Ala Ile Leu Asp Gly Lys Ser Val Asn  
210 215 220

Ser Ser Met Gly Phe Thr Pro Leu Ala Gly Val Val Met Gly Thr Arg  
225 230 235 240

Cys Gly Asp Ile Asp Pro Glu Ile Ile Pro Phe Leu Glu Glu Glu Leu  
245 250 255

Asn Ile Asp Ser His Glu Met Arg Arg Ile Met Asn Glu Asp Ser Gly  
260 265 270

Leu Lys Gly Leu Ser Gly Ile Ser Asn Asp Glu Arg Glu Ile Glu Ser  
275 280 285

Ala Ala Lys Asn Gly Asn Glu Arg Ala Gln Leu Ala Leu Asp Val Phe  
290 295 300

Val His Ser Ile Gln Gln Tyr Ile Gly Ala Tyr Thr Thr Asp Leu Asp

305                      310                      315                      320  
 Gly Leu Asp Thr Leu Val Phe Thr Ala Gly Ile Gly Glu His Ala Ala  
                                  325                      330                      335  
 Tyr Ile Arg Ser Gln Ile Cys Lys Asn Leu Asp Tyr Leu Gly Val Lys  
                                  340                      345                      350  
 Ile Asp Glu Glu Lys Asn Lys Asn Asn Glu Leu Ser Ile Glu Ala Pro  
                                  355                      360                      365  
 Asp Ser Lys Val Lys Ile Ala Val Ile Pro Thr Asn Glu Glu Ile Ile  
                                  370                      375                      380  
 Ile Ala Arg Asp Val Met Asn Val Thr Gln Gln  
 385                      390                      395

<210> 44  
 <211> 1188  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 44  
 ttgatgtcaa aaaaaatact tgcaattaat tctggttagtt catcaattaa gttcaaactt 60  
 tacttgatgc cagaggagaa actattaatt agtggttctg ctgaaaatct tggttcttcg 120  
 acaagtcagc ttcatataaa aactgataaa actaacgaga caagacaaat ccctttaaaa 180  
 aaccactcag aggcaattga ccatattatt gatgttttaa tgtctagtgg ggttgtaaag 240  
 gataagtcag aaatttatgg tgttggtcac cggatttctc atggcgggaag ttactatact 300  
 catgcagtgg cagtcactcc agaagttgaa aaacggattg atgaattgaa ggtgttatca 360  
 cctctgcata atccaaatgg actagcaggg ataaaagcct ttgaaaagtt tcttccagat 420  
 gccaaaggaag tagttacttt cgataattca tttcatcata caatccctaa gaaagcttat 480  
 atgtatgctt tgccatatga gttttatgaa aagtatcaaa ttaggcgcta cgggttccat 540  
 gcccttcac atcagtatgt gtcagaaaaa gcgcgtgaac tttttggtaa agaaaagact 600  
 cgtcgtatga tcacgigtca tttgggaaat ggatcaagcg tttcggcgat cttagatgga 660

aagtcggtta actcttcaat gggctttact cggtagcag gtgtagtgat gggaacgcga	720
tgtggagata ttgatccaga aattattcct tttcttgaag aagaactcaa tattgattca	780
catgaaatgc gtcgaataat gaatgaagac tcagggccta aaggcttata tgggatttct	840
aatgatgaac gtgagattga aagtgcggct aaaaacggta acgaacgggc acaattagct	900
ttagatgtat ttgtacattc aattcaacaa tatattggag catatacaac ggatcttgat	960
ggattggata cattagtatt tacagccgga attggtgaac atgctgcta tattagaagt	1020
cagatctgta agaatttaga ctatcttga gtcaaaattg acgaagagaa aaataaaaaat	1080
aatgagctaa gcattgaagc acctgatagt aaggttaaaa tagctgttat tccaactaac	1140
gaagaaataa ttattgcccg tgatgtaatg aatgtaactc agcaataa	1188

<210> 45  
 <211> 1122  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 45	
atggttgaag aatttggctc accatcgtct tacatccaag gaaaagggtg ctttttgaa	60
agtataagt atcttaaaaa ctttggcaca aaaccgttat tattggctgg cgaaacagtc	120
tataaaattg taggtaagcg ttttgaacag tatcttcaag aaagtggta tgatgtcacc	180
cgtgttcaat ttaatggta atcatccact aacgaagtaa accgggttac agaaattggt	240
aaagaaaata atgtaactgt cgtttatggt ctgttggtg gtaaaacagt tgataccgcc	300
aaagcaattg ccgacaatct ccatctacca gtgttaatta tgccaacatt ggcttcaaat	360
gatgcacctt gttctogtct ttcagtaatc tacactgatg acggtggctt cgatcattat	420
cgtttctaca accaaaaccc taatctggtt ttagttgata ctcaagttat cgtaattggt	480
cccgttcgga tgcttatitc tggaattgct gatgctttag ctaccaatgt tgaggcacia	540
gcagttgctc aagctcatag tgatacaatg cttggtgaaa aacaaaccct tgttggaat	600
gcaatgccc agaaatgtga agagacatta tttaattact cgcacctagc ttagctgat	660
gcagaaaccc atgtcgttac accagcattt tctaatttg ttgaagcaaa tacactaatg	720

agcggctctcg gttttgaaag tgggtggtcta tctgggtgcc acgctattca tgatggctta	780
acaatttttag aagagactca tgatttaaca cacgggtgaaa aggtcgcata cggtagctta	840
acacaattaa tgttgaagg cgctgaccag gaacgtata acaagtactt ccaattttatt	900
ctttcttttag gcctaccaac tactcttgct gatctacatt tagaaaatgt caccgatgaa	960
gaactgctca atgctggaag agcgccttgt tcagaacaag ataccatgga tcgtttgcc	1020
tttaaggtaa ctccagatga cgttgctcaa gcattacgag cagttgatgc atatactaaa	1080
caatatttaa ctaatcatcg ttgtcaccat agtcgtatgt aa	1122

<210> 46  
 <211> 1021  
 <212> DNA  
 <213> Artificial

<220>  
 <223> recombinant DNA

<400> 46	
gataagacgg ttcgtgttcg tgctgacttg caccatatca taaaaatcga aacagcaaag	60
aatggcggaa acgtaaaaga agttatggaa ataagactta gaagcaaact taagagtgtg	120
ttgatagtgc agtatcttaa aattttgtat aataggaatt gaagttaaatt tagatgctaa	180
aaattttgtaa ttaagaagga gtgattacat gaacaaaaat ataaaatatt ctcaaaactt	240
tttaacgagt gaaaaagtac tcaaccaaatt aataaaacaa ttgaatttaa aagaaaccga	300
taccgtttac gaaattggaa caggtaaagg gcatttaacg acgaaactgg ctaaaataag	360
taaacaggta acgtctattg aattagacag tcatctattc aacttatcgt cagaaaaatt	420
aaaactgaat actcgtgtca ctttaattca ccaagatatt ctacagtttc aattccctaa	480
caaacagagg tataaaattg ttgggagtat tccttaccat ttaagcacac aaattattaa	540
aaaagtggtt ttgaaagcc atgcgtctga catctatctg attgttgaag aaggattcta	600
caagcgtacc ttgatattc accgaacact agggttgctc ttgcacactc aagtctcgat	660
tcagcaattg cttaagctgc cagcggaatg ctttcatcct aaacccaaaag taaacagtgt	720
cttaataaaa cttaccgcc ataccacaga tgttccagat aaatattgga agctatatac	780



gtactttgtt tcaaaatggg tcaatcgaga atatcgtaa ctgtttacta aaaatcagtt 840  
 tcatcaagca atgaaacacg ccaaagtaaa caatttaagt accgttactt atgagcaagt 900  
 attgtctatt tttaatagtt atctattatt taacgggagg aaataattct atgagtcgct 960  
 tttgtaaatt tggaaagtta cacgttacta aagggaatgt agataaatta ttaggtatac 1020  
 t 1021

<210> 47  
 <211> 30  
 <212> DNA  
 <213> Artificial

<220>  
 <223> primer

<400> 47  
 atgcagatta atgatattga aagtgcgtga 30

<210> 48  
 <211> 27  
 <212> DNA  
 <213> Artificial

<220>  
 <223> primer

<400> 48  
 ttaataccag ttacgtactg agaatcc 27

<210> 49  
 <211> 34  
 <212> DNA  
 <213> Artificial

<220>  
 <223> primer

<400> 49  
 ttgatgtcaa aaaaaatact tgcaattaat totg 34

<210> 50  
 <211> 29  
 <212> DNA

<213> Artificial

<220>

<223> primer

<400> 50

ttattgctga gttacattca ttacatcac

29

<210> 51

<211> 23

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 51

atggttgaag aatttggtc acc

23

<210> 52

<211> 24

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 52

ttacatacga ctatggtgac aacg

24

<210> 53

<211> 19860

<212> DNA

<213> Lactobacillus reuteri

<400> 53

tttttgtgta ttaatttgta aaatattgcc gttattgaac agttaatcca ataaagacaa

60

taaaatacat aattaatgtg ttagcattat atgtatagaa aacgcataca atttggaat

120

aatataaaaa gggttggtgt tagacatgca tggatttatt ggcgaatttt ttggcaccat

180

ggttttaatc ctattaggag caggatgttg tgctggtaat agtttgaata aaacatatgg

240

gaaacaaagt ggctgggtgt ttatctgtat ttcatggggc ttagcagtta caatgggagt

300

ttatgttgca ggatttctgg gttcattagg gcacttaaact cccgctgtaa caattccttt

360

tgctattttt ggcttattcc catggagtaa cgttatacct tacttacttg gtcaattttct	420
tggatgcgttt gttggtgcag tattagtaat tattcaattc tatccacaat ttaaagcaac	480
cccaaatgaa gaagaaggaa ataatgttgg tatttttgct actcgtccag cgataaatag	540
tccaattttt aactttttct cagaagtgat tgcgaccttt gcattttatt tcatcttatt	600
aaatcttggc aactttacac agggattgaa gccatttato gtaggaatgg ttattgcagt	660
tgttggtaca tgtctcggga caactactgg ctttgcatta aaccagctc gtgattggtc	720
accacgttta gcataacta ttttgccaat tcctaataag ggtgtttcag aatggtggtg	780
tgcattgggtt ccaatgtgtg gcccaattgt tgggggcctt cttgcttgtg ctttacaac	840
ggcactagtt tagtgaacct agagaaaagg aggcataatta atatagcctc tttatttagt	900
ttaaataaaa tatgaaatat ctctagtaggag aaaattaatg aaaaaagaat ttttaaaaag	960
tagtaatgaa caattaaaaa aattttccga gattgttaat ggggataagc ctttacgtaa	1020
agttacggct gatgaaaagc taaaggtcgg ttagatttta ggaacttctt caattgtttt	1080
aacagtgtcg gattccaaag ataagattgt atacggagcg tatgaatatg accatgcagt	1140
tcaagatggt attgtagtta atttcatgga atcagttaat attttaagac gcttaaaaga	1200
aaaagctgag aaagtattag gacgtgaact taaaacggca tgtggtgcta ttccaccgaa	1260
gacaggagag aagagtgcc aagtgttgc taatgttato gaagagacag gcttgctttg	1320
tacagtggtt gaagatgaac cgacagcagc tgcgaagtto ttaagattgt caaatggtac	1380
agttgtagat attggaggag gaacaactgg gattagtatt tttaaagata acaagctcat	1440
ccatgttatt gatgaagcaa caggcggatt tcatatgacg cttgttcttg gaggaagata	1500
taaaataaaa aatgatgaag cagaaaaatt aaagcgtaac aagaataaag aatctgaagt	1560
atatgctgtt attaaacctg tagttgagaa aatggcagca attgttcaaa atatgggagt	1620
agaaattatt gatccagtaa tagtggtggg aggtgcaact aactttactg aatttacaac	1680
aacctttagt aaagatttaa agcgtaaagt ttataaacgg ctttatcctc aatttgttac	1740
gccactaggg attgcaatgt ttgatgatta gaataaataa gaggctgggc accccaacc	1800
tccttttaat ttttaataat tttttcagta taaatccatt gaattactga acgatcaaat	1860

acattaatct cactagctgg aataataggt tgagaacaat ctactgtata gacccaacct	1920
gctttattac taacatcatt cagatcattt attgaataga tatatggata cccatttaaa	1980
tcacgggctt taaaggaaat atcattttta ttgaaaaaat cttttgagat ttcataaacg	2040
gacttatttg agcgccattg taaatctctt ggaatagtat agattttctt tattgoggaa	2100
ttatattttc gatactttga tgggtgcatt cctacttttt gcttgaaaat tttagtaaag	2160
taacttgtct gtgaaaaacc aacttgatga gccaatitat taattgggtg atttgaaaaa	2220
attaattttt cttgagcaag tgcaattttt tgtagattta tatagttaat aaaattgtca	2280
ttaaaataat ttttaaagat tcgacttaag tatgatgggtg agagataaat cctttgagaa	2340
acgttttcta aagtaagcga tttttctaaa ttggaattaa tgtatttaag cgccatgggt	2400
atattttttt caatatcact tagagtacca tcatttctgt tattaagaat aggaggatta	2460
gtaacgttag ctattgaatc atctccagaa atattcaaaa tccattaag gactttgatt	2520
agtgaactta gcttaggagc ctggaatggg gtaaggacag ctatgcagtc attggaactg	2580
tcaataaaat ttttgaaga aatttcaata tatttactac ataaatcaat agcgtctgat	2640
tctatatgtg attcatcaag aacaaagaaa ccacttaaag atgagcttat aactagtga	2700
aaaacaaagt aatttttaaa atcgagtttt cgtaaatgtt caagtgaat atttgagtca	2760
aaaagaaggg tgttgaatc aacaattgct ccgtaaatgc ttgtgaaaat tatattatta	2820
ttggttattt cctgaaatgt ttttgttacc tttgaaatgt cattcaagaa ttttgaagaa	2880
tattcgtaca ttgaatttc gcctactttt taccaaattt tttgaagaa atgccgttta	2940
cctctatata ttagcataca ttacacata aaaacgcttt cctgtaaatt ttgtgataca	3000
taataataaa ttattgttct ttttaagtat catacatttt ttaagataat atatcataaa	3060
tatcatgtta taaaattaac atgtaccaaa ttgtaagcga tttctcatta tcgctatttg	3120
tttttatact taggaggcat tcttatggga caagaagcac ttggtttaat tgaaaccgaa	3180
ggactttag ctccaattga agctgctgat gcaatggtaa aagctgctaa tgttaaatta	3240
attggtcaag aaaagattgg tcatggatta gtcacagtaa tggttcgtgg tgatgttga	3300
gctgttaagg cttcagttga tgccggagta caagctgccg aaaatatttg agaagttgtt	3360

tcgagttacg taattcctcg tcctcaatct gaagttgata agctcttacc gcatcatgga	3420
gaataattga taaaaaatta aagcccttat acagacggct aggtacagaa atctgtatta	3480
agagctttat tgtaagagc ttttatagtc aggaggaaaa ataatgaatg attttctgaa	3540
ttctactagt actgttccag aatttgttgg tgctagcgaa attggagata ccattggaat	3600
ggtaattccg agagttgatc aacaactatt agataaatta cacgttacaa aacaatacaa	3660
gactttaggt attttgagtg atcgtactgg tgctgggtcca caaattatgg caatggatga	3720
aggaattaag gctactaaca tggaatgtat tgatgttgaa tggccacgtg atactaaagg	3780
tggaggaggc catggatgtt taattatcat cgggtgtgat gatcctgcag atgcacgcca	3840
agctattcgg gttgcacttg ataactttca tcgtacattt ggtgacgttt ataacgcaa	3900
agcgggtcac ctggaattac aatttacagc tcgtgctgca ggtgctgcac atcttgatt	3960
agggtcagtt gaagggaag catttgggtt gatttgttgt tgtccttcg ggattgggtg	4020
cgtgatggga gataaggctt taaagactgc tgggtgtgaa ccgcttaact ttacttcacc	4080
aagtcatggt acaagtttct ctaacgaagg ttgcctaact attaccggtg actcaggagc	4140
tgttcgtcaa gctgttatgg ctggacgtga agtaggatta aagtattgt cacagtttg	4200
tgaagaacca gttaatgatt tcccatcata cattaagtag atctagaagg aggactactt	4260
tattatgaaa cgtcaaaaac gatttgaaga actagaaaaa cggccaattc atcaagatac	4320
atttgttaaa gaatggccag aagaaggttt cgttgcaatg atggggccta atgaccctaa	4380
gcctagtgtg aaagttgaaa atggcaagat cgtagagatg gatggtaaaa agctcgaaga	4440
ttttgatttg attgacttgt acattgctaa gtatggaatc aatattgaca acgttgaaaa	4500
agttatgaat atggattcta ccaagattgc acggatgctt gttgatccta atgtttctcg	4560
tgatgaaatt attgaaatta catcagcttt gactcctgct aaggctgaag agatcatcag	4620
taagcttgat ttigtgtaaa tgattatggc tgtaagaag atgcgcccac gtcgtaagcc	4680
tgacaaccag tgtcacgtta ccaatactgt tgataaccca gttcaaattg ctgctgatgc	4740
tgctgatgcc gctcttcgtg gatttccaga acaagaaacc acgacagctg tggcacgtta	4800
tgcaccattc aatgctattt caattttaat tgggtgcacaa acaggtcgcc ctggtgtatt	4860

gacacaatgt tctgttgaag aagctactga attgcaatta ggtatgctg gttttaccgc	4920
atatgctgaa accatttcag tttaacgtac tgatogtgta tttaaccgatg gtgatgatac	4980
tccatggtct aaaggcttct tggcatcttg ttatgcatca cgtgggttga agatgcgatt	5040
tatttcaggt gccggttcag aagttttgat gggttatcca gaaggtaagt caatgcitta	5100
ccttgaagcg cgttgtatit tacttactaa ggcttcaggt gttcaaggac ttcaaaatgg	5160
tgccgtaagt tgtattgaaa ttccctggtgc tgttccaat ggtattcgtg aagttctcgg	5220
tgaaaacttg ttatgtatga tgtgtgacat cgaatgtgct tctggttgtg accaagcata	5280
ctcacactcc gatatgcggc ggactgaacg gtttattggt caatttattg ccggtactga	5340
ttatattaac tctggttact catcaactcc taactacgat aataccctcg ctggttcaaa	5400
cactgatgct atggactacg atgatatgta tgttatggaa cgtgacttgg gtcaatatta	5460
tggatttcac cctgttaagg aagaaacat tattaaggca cgtaataagg ccgctaaagc	5520
cottcaagca gtatttgaag atcttggatt accaaagatt actgatgaag aggtcgaagc	5580
agcaacgtat gctaacaccc atgatgacat gccaaagcgg gatatggttg cagatatgaa	5640
ggctgctcaa gatatgatgg atcgtggaat tactgctatt gatattatca aggcatgtga	5700
caaccacgga tttaaagat tgcgtgaagc aattttgaac cttcaaaaac aaaaagttgt	5760
tggtgattac ottcaaacat ottctatit ttgataaagat tggaacgtca cttctgctgt	5820
taacgacgga aatgattatc aaggaccagg tactggatac cgtctatatg aagacaagga	5880
agaatgggat cggattaaag acttaccatt cgcccttgat ccagaacatt tggaactgta	5940
gagaggaggt aatctgttat ggctgatatt gatgaaaact tattacgtaa aatcgttaaa	6000
gaagttttaa gcgaaactaa tcaaatogat actaagattg actttgataa aagtaatgat	6060
agtactgcaa cagcaactca agaggtgcaa caaccaaata gtaaagctgt tccagaaaag	6120
aaacttgact ggttccaacc agttggagaa gcaaaacctg gatattctaa ggatgaagtt	6180
gtaattgcag tcggtcctgc attcgcaact gttcttgata agacagaaac tggatttcct	6240
cataaagaag tgcttcgtca agttattgct ggtattgaag aagaagggt taaggcgcgg	6300
gtagttaaag tttaacggag ttcagatgta gcattctgtg ctgtccaagg tgatcacctt	6360

tctggttcag gaattgctat tggatatccaa tcaaaaggga cgacagttat tcaccaaaag	6420
gatcaagacc ctcttggttaa ccttigagtta ttcccacaag cgccagtact tactcccgaa	6480
acttatcgtg caattiggtaa gaatgccgct atgtatgcta aggggtgaatc tccagaacca	6540
gttccagcta aaaacgatca acttgctogt attcactatc aagctatttc agcaattatg	6600
catattcgtg aaactcacca agttgttggtt ggtaagcctg aagaagaaat taaggttacg	6660
tttgattaag gaggcagaat gatgagtga gttgatgatt tagtagcaaa gatcatggct	6720
cagatgggaa acagttcatc tgctaatagc tctacaggta cttcaactgc aagtactagt	6780
aaggaaatga cagcagatga ttaccacatt tatcaaaagc accgtgattt agtaaaaaca	6840
ccaaaaggac acaatcttga tgacatcaat ttacaaaaag tagtaaataa tcaagttgat	6900
cctaaggaat tacggattac accagaagca ttgaaacttc aagggtgaaat tgcagcta	6960
gttgccgctc cagctattca aaagaatctt caacgagctg cagaattaac acgagtacct	7020
gacgaacggg ttcttgaaat gtatgatgca ttgcgtcctt tccgttcaac taagcaagaa	7080
ttattgaaca ttgcaaagga attacgggac aagtatgacg ctaatgtttg cgcagcatgg	7140
tttgaagaag ctgctgatta ttatgaaagt cgtaagaagc taaagggcga taactaagct	7200
ttttagtcag agtagggagt tttatgtatg gcaactgaaa aagtaattgg tgttgatatt	7260
gggaattctt ccaactgaagt tgcattggca gatgtaagcg atagtgggca agttcacttt	7320
attaactctg gtattgtccc tactactggg attaaaggta ctaagcagaa tctagttaga	7380
attagggatt caattactca agttctgaat aaatctaatac tgacaatcga tgatattgat	7440
ttaattcgaa tcaatgaagc cagccagta attggtgatg ttgcaatgga aactattaca	7500
gaaacagttg taacagaatc aacaatgatt gggcataatc ctaatacacc aggtggtata	7560
ggaacagggg ctgggataac agttcgtttg ctgtatctct taaagaaaac tgataaaagc	7620
aaaaattata ttgtttagt tcctaaggat attgattttg aagacgttgc taaacttatac	7680
aatgcttatg ttgcctctgg ttataaaata acagcagcaa ttctaagaaa cgatgatggt	7740
gttttagttg ataatcggtt aaatcataaa attccgattg tcgatgaagt tgctatgatt	7800
gacaaagttc cgttaaataat gctggcagct gtagaagttg ctggccctgg acaagtaatt	7860

tcacaacttt caaaccgta tggatcgt acctatttg gactaactcc agaagagact	7920
aagaatattg ttccagtttc tcgagcgctt attggaaatc gttcggctgt tgttattaag	7980
actccagctg gggatgttaa agcgcgagta attccagcag gtaaaatcat aattaatggt	8040
gatactggaa aagaagaagt tggagtttct gaaggtgctg acgccattat gaaaaagggt	8100
tctagtttcc gccatattaa caatataact ggtgagtctg gaaccaatgt tggaggaatg	8160
ttggaaaaatg ttogtcaaac aatggcagat cttacaggaa agaaaaatga tgaaattgct	8220
attcaagatt tacttgctgt tgatactcaa gtaccagttg aagttcgagg cggctctagct	8280
ggtgaattct caaatgaatc agcagttggg atcgcagcaa tggttaagtc agatcatctt	8340
caaatggaag ttattgctaa acttattgaa aaagaattta atacaaagggt tgaaattggt	8400
ggtgctgaag ttgaatctgc aattcgtgga gcattaacaa ctccaggaa agataagcca	8460
atcgcaatcc ttgatttagg tgctggctca acagatgctt caatcattaa taaagaaaat	8520
aatacagttg caattcactt agctgggtgt ggtgatatgg taacgatgat tattaattct	8580
gaattaggat tgaatgatat tcatcttgca gaagacatca aacgctaccc attagcaaag	8640
gtagaaaacc tttttcaaat togacatgag gatggttcgg ttcaattctt taaagatccg	8700
cttccatcat cactgtttgc caaagttgta gtaattaaac cagatggata cgaaccagta	8760
actgggaatc caagcattga aaaaattaaa ttagtgcgtc aaagtgcata gaaacgagta	8820
tttgttacga acgctttacg ggcaacttaag tatgttagtc caactggaaa tattogtgat	8880
attccgtttg ttgtaattgt cgggtgttca gccttagact ttgaaattcc acaacttgtt	8940
acagatgaat tagcacactt taatttagtt gctggtcgag gaaatgttcg tggagttgaa	9000
ggaccacgaa atgccgttgc aactggattg attttaaggt atggcgaaga aagaaggag	9060
cgttatgaac aacgatgatt cacaacgtcc ctcgattgtc gtcggactag aaaatggaat	9120
aacgattcca gatagtgtca agccactttt ttatggaatt gaagaagaac agatcccagt	9180
ctcagttcgt aaaatcaata taaatgatac tgttgaaaga gcataccaat cagctcttgc	9240
atcaaggcta tctgtaggaa ttgcttttga aggagatcat tttattgttc actataagaa	9300
cttaaaagaa aatcagcctt tatttgatat gacaatcaat gataaaaagc aattacgaat	9360



tttaggagca aatgcagcga gattagtaaa aggaatccct ttaaggaaa tggcaaacag	9420
gtgatttaat tatgaagtct ttgggctatg tagaatgtaa tggattatct ggcgctattg	9480
tggtgctga caggatgcta aaaactgcag atgttgaact tagtagtatt caaaatacga	9540
aaggtaatgg atgggtcacc ttacaagttt ctggtgaact atcagctata actgttgcgg	9600
ttcaagctgt aaaagactat ttacctgatg tatatgtaac gtcagcgata atagggcgtc	9660
cagcaatagg gttgaactcc ttgggcaaaa cagatttatt gcaaccaaatt ccagaaaagc	9720
agcaaaatat tgctgaaaag gaaaaggttg ctgaaccatc ttcaattaaa gaagagatag	9780
tacagaatag tgaaaattct gctgaacctg gtgttcaaac tgagcgatca ttagagggca	9840
aagatgaaat cgaagcttgc gattcgtcta atgataaaca agataccaac tctaatagata	9900
atgaagtcac atgcaatatg tgtggagatc caaatgtcc acggaaatta ggagaaccgc	9960
ataagaagtg tatccattac aatgaattaa agaaaaagta ggaggaaata actatgaata	10020
acgctttagg aatgattgaa acacgcggat tagttgcatc tattgaagct gctgatcaaa	10080
tggtaaaggc tgctaattga acattaactg gccaagaaaa gattggtagt ggattggtaa	10140
ctgttatgat tctgggtgat gttggtgctg taaaggctgc cgttgatgct ggtgtacaag	10200
ctgctgaagg tctcggcgaa gttgtatcgt cttacgtaat tcctcgtcca catgaagaag	10260
ttgaaaagat tttaccaggt ggatcagatt cagacgctga atagaaaatt ttaataaaaa	10320
ggaagattac gtatggatga agaacattta agaacactta tccggacgat tgttagagaa	10380
acacttaatc ctaacctagt tccaattggt gtttcaaata accatgtaca tttgacggaa	10440
gaagactttc aaaagctatt ccctggtcaa aagattgaaa tgctaaagaa acttcgtcaa	10500
catgcggact ttgctgcaaa gcaaaactgtt gatctgatcg ggcccaaagg caccattgaa	10560
catgttcgtc taatggggcc ataccggtca cactcacagg tagaaattgc ccgttcagaa	10620
aactttacac taggaattga tgctccaatt agaattgtctg gtgatcttga tggcaccct	10680
tcaattaagg ttcggtcacc atatcggaag attgaaattc aagggtgtaatt tgttgcaaag	10740
cgacacatcc acatgagttt agaagatgcc aagcgctttg gcgtaaagct cgggtgattca	10800
atgcaggttg aagtagatgg cgatggtgga cgtaaaacca tttttgatga cgtagttgct	10860

cgccctcgtg aagactttgt cctigaaatg catattgata ctgatgaagc caatgcagct 10920  
 aatgtcggac taggtaataa ttctttcgga aaagttatta tcaagaagaa aaactaactt 10980  
 tttgagaaac taataagggg gtgaatagat ggataaccta gtacaacagg ttatgcaacg 11040  
 attagaagaa cgaaagcata cgagcgttga agttactttt aatcatcaag ttgccccgcc 11100  
 tagtgaacag atttttttga gaaacggaaa agttattcta aaagatattt cgattgagtt 11160  
 aataacggac ttatattcaa tggaaaagac taacgcttgg gttaaatggg tgttagaagg 11220  
 aattagctat gatgttaaatt ttactttttt aattaatgaa cagatgggta attttattcc 11280  
 acggatgatg attttggact ggccgatcctt gtttgttgta aataacgaat cgccagtaat 11340  
 tgccagttat aatcggatta ttaccagaga agagatagct gctaaaccag ataaatcgat 11400  
 tcttgttaga tatcaaaagc aacatattac agatgaagca cttgatattt gtaactataa 11460  
 aaaaattaaa ataaagatta ggactgaaga aaattgtata tggcgagagt agtaggtagt 11520  
 gttgttgcaa cccaaaagga tccatcctta gttggaaaga aactaatgat agttcaacag 11580  
 attaatccg accaacaacc agttcgattt gaacaagttg ccgctgatac agtaaatgct 11640  
 gggattgggtg ataattgtatt aatagttcgt ggtgctgggtg caagacgtgc tgataaagag 11700  
 cgtgatgagg atcaagtaag ggacgttaat gactgtacga tagttggaat aattgaccgt 11760  
 tttgataagt agtgtgcatt ggaggcatca aaatggctat ttacacaaaa ggtggtgaca 11820  
 agggagaaac aagtttattc gatggaacga gggtacctaa ggattcatta cgagttgaaa 11880  
 cttatggaac ttttgatgaa ttaaacgcta atattagttt ggcagataaa ttctgtgaaa 11940  
 gtaaacgtaa taagaagcctt ttacaagaga tcgaatataa aatgtttttc cttcaaggtg 12000  
 agatagcgac agaaaaacgg cagtatttta ctgataaaag taagattatt actgatgaag 12060  
 atactcgaaa acttgaaaag gttattgatg aatatacatc aaaactgcc aactgttcata 12120  
 gttttatctt acctggttcg agtactgcgg gtgcacaact tcatatttgt cgaacaatct 12180  
 gtcgtcgtgc agagcgacta tttgtcggc tatcaaagaa tgtaaaattt cgtccagagc 12240  
 tagaaagata tattaatcgt ttgtcggatt ttttatatat ttagcgcgt gatgaagact 12300  
 atgaagattt attaaatagt gtaactgatg acgtgttaaa aatttacaaa cgttatcaag 12360

aagaaaagga tgtgcgttaa gaatgaacga ggaacaaatt agtaagattg ttgaaaacgt 12420  
aatcaagaat aatgcttcta aaaatctatt tgatcggcac aaaatggaaa aagtaatcga 12480  
tgcggctgta gctcgtgcta atgaattggg tgttgagta acaattgcta ttatgaaagc 12540  
tgatcaagta ttgcaaatga gctaccatat gccaaatgct aatttagtaa gttgtacttt 12600  
agctcctaaa aaggcatggt cagcattagc aatgaaggaa cctaccaagg atattagtaa 12660  
ggatatccaa ccaggtgccg gattatatca aatggaaaca atgcttgatg gtaagttagc 12720  
atcttttgca ggtggtattc cattgaagat taacgatgaa attattggag cgattggtgt 12780  
tagtggtgga ttggttgaag aagatcaatc aatttgtaa gctgctgtg cagaattttt 12840  
gaaggagagt aagtagatat gcagattaat gatattgaaa gtgctgtacg caaaattcct 12900  
gccgaagaac tagataatgc cagctcttca agtgcaaacg ttgcagctac tactgataat 12960  
ggtcatcgcg gaattttcac taatgtcaat gatgcaattg ctgctgcaa agctgctcaa 13020  
gaaatatatc gggataagcc aattgctgtt cgccaacaag tgattgatgc cattaaggaa 13080  
ggattccgcc catatattga aaaaatggct aaagatatca aagaagaac aggaatggga 13140  
acagtagagg ccaaaattgc taagttaaac aatgccttgt acaacactcc tggtoocgag 13200  
attcttgaac cagttgtaga aaacggtgac ggtgggatgg ttatgtatga acggttacca 13260  
tatggtgtta ttggtgcggt tggcccaagt acaaaccctt cagaaactgt aattgctaatt 13320  
gogatcatga tgcttgccgg tggtaatact ctttactttg gtgctcacc tggcgcaaag 13380  
aatgttactc gctggacaat tgaaaagatg aacgatttta ttgcagatgc aacaggcctt 13440  
cataatttag ttgtaagtat tgaaacacca acaattgaat cagttcaaca aatgatgaag 13500  
caccocgaca ttgcaatgtt agcagtaact ggtggcccag ctgttgttca ccaagcaatg 13560  
accagtggta agaaagcgtt tgggtctggt cctggtaatc ctctgcaat ggttgatgct 13620  
actgctgata ttgatttagc tgctcataat atcattacat ctgcttcatt tgataatgat 13680  
attttatgta ctgctgaaaa ggaagtagtt gcagaaagta gcattaaaga tgaattaatt 13740  
cgtaagatgc aagatgaagg tgcctttgta gttaaccgtg aacaagccga taaattagct 13800  
gatatgtgta tccaagaaaa tgggtctcct gatcgtaaat ttgttggtaa ggatgcaact 13860

tatatcttag accaagctaa tattccttac acaggccacc cagttgaaat tatttgtgaa 13920  
cttcctaagg aacatccatt agtaatgact gaaatgttaa tgccaatttt accagttgtt 13980  
tcttgtccaa catttgatga tgttttgaag actgctgttg aagttgaaaa aggtaacat 14040  
cacacagcta ctattcattc caataacott aagcatatta ataatgctgc tcaccggatg 14100  
caatgttcaa tctttgttgt taatggccca tcctatgttg gtacaggtgt tgcagataat 14160  
ggagctcact caggtgcttc agcattaaca attgctacgc caactggtga aggaacatgt 14220  
actgcacgaa catttactcg tcgggttcgt ttgaactcac cacaaggatt ctcagtacgt 14280  
aactggtatt aatgggaggc ataattccaa tggaaaaata tagtatgcca acccggattt 14340  
attcggaac agatagtttg aaagaactag agacacttaa taatgaacgt attttattag 14400  
tctgtgattc tttcttgctt ggtagtgata ccttaaaaga aattgagagt cacattaagg 14460  
ataataataa gtgtgaaatt ttctctgatg ttgtccccga tcctccacta gataagatta 14520  
tggaaggggt tcaacaattc cttaaactta aaccaacaat tgtgattggt atcgggtggcg 14580  
gatcagcttt ggatactggt aagggaattc gtttctttgg tgaaaagttg ggcaagtga 14640  
agatcaatga atatattgct attccaacaa cgagtggtag tggttcagaa gttacgaata 14700  
ctgcggttat ttctgatacg aaagaacatc gtaaaattcc tattttggaa gattatttga 14760  
cacctgattg tgctttacta gatcctaaac tagttatgac tgctcctaag agtgtaactg 14820  
catattcagg aatggatggt ttaacacatg cacttgaatc ttgggttgct aaggatgcaa 14880  
atttattcac agttgcatta tcagaagaag caattgatgc cgttattaaa catttagttg 14940  
agtgttatcg tcacggcgat aatgtggatg ctgtaagat tgttcatgaa gcatcaaata 15000  
ttgccggaac tgcatttaat attgctggat tagggatttg ccactcaatt gcgcatcaat 15060  
tgggagctaa tttccacgtt ccccatggtt tagcaaatac aatgctcttg ccatatgtta 15120  
tcgcatataa tgctgaacat agtgaagagg cattgcataa gtttgcaatt gctgctaaga 15180  
aagctggaat tgctgctcct ggagtaggcg atcgtcttgc agtaaagcga ctaattgcta 15240  
aaattaggga aatggcacga caaatgaatt gtccaatgac tcttcaagca ttcggtgttg 15300  
atcctgctaa agctgaagaa ttagctgata ctgttgttgc aaatgcgaag aaagatgcaa 15360

cattccctgg caatccagtt gttcccttcag ataatgatct gaagatggtt tacgaagcaa 15420  
taattcgta atttagttta tttggagtga tttgatgtca aaaaaaatac ttgcaattaa 15480  
ttctggtagt tcatcaatta agttcaaaact ttacttgatg ccagaggaga aactattaat 15540  
tagtggttct gctgaaaatc ttggttcttc gacaagtcag ctttcatata aaactgataa 15600  
aactaacgag acaagacaaa tccctttaaa aaaccactca gaggcaattg accatattat 15660  
tgatgtttta atgtctagtg gggttgttaa ggataagtca gaaatttatg gtgttggtca 15720  
ccggatttct catggcggaa gttactatac tcatgcagtg gcagtcactc cagaagttga 15780  
aaaacggatt gatgaattga aggtgttato acctctgcat aatccaaatg gactagcagg 15840  
gataaaagcc ttgaaaagt ttcttcaga tgccaaggaa gtagttactt tcgataattc 15900  
atttcatcat acaatcccta agaaagctta tatgtatgct ttgccatatg agttttatga 15960  
aaagtatcaa attaggcgtc acgggttcca tgcccttca catcagtatg tgcagaaaa 16020  
agcgcgtgaa ctttttgga aagaaaagac tcgtcgtatg atcacgtgtc atttgggaaa 16080  
tggatcaagc gtttcggcga tcttagatgg aaagtcggtt aactcttcaa tgggctttac 16140  
tccgttagca ggtgtagtga tgggaacgog atgtggagat attgatccag aaattattcc 16200  
ttttcttgaa gaagaactca atattgattc acatgaaatg cgtcgaataa tgaatgaaga 16260  
ctcagggtt aaaggcttat ctgggatttc taatgatgaa cgtgagattg aaagtgcggc 16320  
taaaaacggt aacgaacggg cacaattagc tttagatgta tttgtacatt caattcaaca 16380  
atatattgga gcatatacaa cggatcttga tggattggat acattagtat ttacagccgg 16440  
aattggtgaa catgctgctt atattagaag tcagatctgt aagaatttag actatcttgg 16500  
agtcaaaatt gacgaagaga aaaataaaaa taatgagcta agcattgaag cacctgatag 16560  
taaggttaaa atagctgtta ttccaactaa cgaagaaata attattgccc gtgatgtaat 16620  
gaatgtaact cagcaataaa atggggatga tactatggct aggcaggata tcaaacggac 16680  
aattcaagaa tatgttccgg gtaaacaggt aacattagca catatcgttg ctaaccctac 16740  
gccagacatt tatgagaaat tagggataga aactcctaaa aatgcgcttg gtattttgac 16800  
aataacgcca agtgaagcct caattatcgc tggggatatt gctacaaaagt cgagtaatgt 16860

tactctaggg ttcatatgac gatttagtgg ctcggttgta attgtgggag aagtttctga 16920  
aattgaatca gctttgcgtc atgtggttga taagctacaa acgttactgg ggtttgatgt 16980  
tcctgaaatt acacgaacat aacattagaa gtgtattcat ttacgctaac gtgtagtaga 17040  
tgaatacaact ttttagaaaag gagggagatg caatatggcg aatcatcagc gaattctagc 17100  
gtttgaaaat ggatttaatt ttcgagatct tgggtggttat agaactattg atggcgaaaag 17160  
tctgaaatgg aataatcttg ttcgttctgc gcatctctcc tattttacac ataagtagca 17220  
aagaaaactt tatggatatg gtattaggac aattattgac tttcgttcaa cttccgaagt 17280  
agctttttat cccgaccaat taacatcatt gatgaattat attcggatac cggctcttga 17340  
gaatgacctt actgaaagta atattagtagt tgctgaagca cgaaaaagt tttcaaagga 17400  
tcacacaagc ggttttaatc gcatgatgga agtatattgt caatttgtca ctgatgagaa 17460  
agcacaagaa gcatttcaca cttttattaa aaaattatgc ctacattcag cgcagggttg 17520  
tgttttatct cattgctctg cggggaaaaga cgtactggt ttaggagcaa tttatttact 17580  
aagtcttcta caagttccag tagatataat ttatcaagat tatattttta ctaataaagc 17640  
atcaacaaaa aggataaaaag aacgattacg ttatgctata aaaaataacc taggtgataa 17700  
ttatcttcac tcaatttacg atctttcaac agcaaatagg tgttattatg atcaagcaat 17760  
ctctcttatt aataataaat atgggtggaat gacctcttac ttaaaagatg tgttacaat 17820  
cagtatttca atgggtgaac aactaagata cttatatctg acaaagtga tttaggctta 17880  
gtaaaaatta aaagccattg atataataat ggctaaaaaa gaggctagaa ttgaatagcc 17940  
tctttaacat acataattct tataggtgga tggtaataat gacaactttt ttttaattcg 18000  
tcacggggaa acctatgcta atcgattaaa ttatatccaa ggtacattaa atgatagatt 18060  
aacaagtctg accaaacagg gaatgctgga agcagcgaat tatcaaaaat tgtttgataa 18120  
taatcaaatt gattatgtct atacaagtcc gtttaaggcga gcagtaaaaa cggggcaaat 18180  
aatttgtgct acgactaata ttaagttgca ggttgatgaa cgtctagcag aaatatctta 18240  
cggtaaatgg aatggggcag atattagtaa attaaagcaa cagtattcga tgtattttga 18300  
tgttgaaacg aatgacgtgc gaccacattc aattttgata aatcaaggcg aaaactttga 18360

acatgctcgt gcacgaatat ggtcattttt attggatact tcttataagt atccacaaca 18420  
 aaatatttta ataattacac atggctggat aataaaaaat atcatttcgt tgtgtcttga 18480  
 gaatattgat gggacttcat tcaaaaatcc caataatcta agtattagta agatccaatt 18540  
 gaatccggca ttaaagcagc aacgaatatg ttattataat cgaccgttca tagggacgat 18600  
 gatattatga gtcttattac aattcttttg atatttggg gacttaatat tgatacgttt 18660  
 attgcactat tatttctttt acgaaactat aattaccggt taccgattat tggctttgga 18720  
 gtagcaacgc ttattttatg gatctttggg gtaattttag gaaaagggt agcatttcta 18780  
 tttccagatt ggattacagg atttatgggc attattttta tctttatagc gctttttgaa 18840  
 caggatgacg aaaaaagac aactaatata agttttctct cattacttct gttttgttta 18900  
 agccttgggt gagataatct tgctgtttat attccattgg tggttaacct tagttggagt 18960  
 cagattatat acgtaggaat aatttttgaa atttggtcag tcctattaat tctattagga 19020  
 aaacaatttg ttttaataaa accgttgga tatttggttg aaaaatatgg taattttgga 19080  
 agcaaaattg tttatgtttt agcgggttta tatattattt ggaatagtca ttttaattaat 19140  
 cacottatta gaatttttaa ttaagttcag caactaattt atcgatatta atattttcaa 19200  
 ctgccgaac aggaattacc ttctttaccc cagcgcttaa cagaagattc ttggaatatt 19260  
 caatgtcggc aggtctttt acaagatcaa tctttgtaac tacacctaaa gtaggtttcg 19320  
 aaaacattga acagaagcca gcgggaaaa caagtcgttt gtcaaccgca ctttgtaata 19380  
 aaacaactat atcagcatcc atcgaggtta cacgtaacgt gctcatcata ttatgatgct 19440  
 ccatatatcc tcctggtgtg tcaataatat ttgatgaaaa ttcaattgct tgtgttttat 19500  
 tatatttaat ttgttgattt tctaatoctt gagtaagggt tgttttacca catgctattg 19560  
 ctccgataaa catagtctgt ttcataatta aatacctcca ccaattctac aaaaatatac 19620  
 tatttatctg tattataata aaagcggtta cacatagcca tagataaaaa aagattagt 19680  
 aggaattata gatgctaaca gcacatgtag tttatgccac gatgactggt aataatgagg 19740  
 aagtagcaaa cattgtatgt gatagtttga ctaattttaa tgttaaagt acagagtctg 19800  
 agatatcaca aactgatgta gcagatttta tgaaggctga cattttagtt gtttgtgctt 19860

<210> 54  
 <211> 708  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 54  
 atgcatggat ttattggcga attttttggc accatggttt taatcctatt aggagcagga 60  
 tgttgtgctg gtaatagttt gaataaaaca tatgggaaac aaagtggctg gtggtttatc 120  
 tgtatttcat ggggcttagc agttacaatg ggagtttatg ttgcaggatt tctgggttca 180  
 ttagggcact taaatcccgc tgtaacaatt ccttttgcta tttttggctt attcccatgg 240  
 agtaacgtta taccttactt acttggtoaa tttcttgggtg cgtttgttgg tgcagtatta 300  
 gtaattattc aattctatcc acaatttaaa gcaaccccaa atgaagaaga aggaaataat 360  
 gttaggtattt ttgctactcg tccagcgata aatagtccaa tttttaactt tttctcagaa 420  
 gtgattgcga cctttgcatt tattttcatc ttattaaatc ttggcaactt tacacagga 480  
 ttgaagccat ttatcgtagg aatggttatt gcagttgttg gtacatgtct cgggacaact 540  
 actggctttg cattaaacc agctcgtgat tggtcaccac gtttagcata tactattttg 600  
 ccaattccta ataagggtgt ttcagaatgg tggtagcat gggttccaat gtgtggccca 660  
 attgttgggg gccttcttgc ttgtgcttta caaacggcac tagtttag 708

<210> 55  
 <211> 834  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 55  
 atgaaaaaag aattttttaa aagtagtaat gaacaattaa aaaaattttc cgagattgtt 60  
 aatggggata agcctttacg taaagttacg gctgatgaaa agctaaaggt cgggttagat 120  
 ttaggaactt cttcaattgt tttaacagtg ctggattcca aagataagat tgtatacgga 180  
 gcgtatgaat atgaccatgc agttcaagat ggtattgtag ttaatttcat ggaatcagtt 240  
 aatattttta gacgcttaaa agaaaaagct gagaaagtat taggacgtga acttaaaacg 300  
 gcatgtggtg ctattocacc gaagacagga gagaagagtg ccaaagtggg tgctaattgtt 360



atcgaagaga caggcttgct ttgtacaggt gttgaagatg aaccgacagc agctgcgaag	420
ttcttaagat tgtcaaatgg tacagttgta gatattggag gaggaacaac tgggattagt	480
atttttaag ataacaagct catccatgtt attgatgaag caacaggcgg attcatatg	540
acgcttgctt ttggaggaag atataaaata aaaaatgatg aagcagaaaa attaaagcgt	600
aacaagaata aagaatctga agtatatgct gttattaaac ctgtagttga gaaaatggca	660
gcaattgttc aaaatatggg agtagaaatt attgatccag taatagtgtt gggagggtgca	720
actaacttta ctgaatttac aacaaccttt agtaaagatt taaagcgtaa agtttataaa	780
ccgctttatc ctcaatttgt tacgccacta gggattgcaa tgtttgatga ttag	834

<210> 56  
 <211> 1080  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 56	
atgtacgaat attcttcaaa attcttgaat gacattcaaa aggtaacaaa aacatttcag	60
gaaataacca ataataatat aattttcaca agcattaccg gagcaattgt tgattgcaac	120
acccttcttt ttgactcaaa tatttcactt gaacatttac gaaaactcga ttttaaaaat	180
tactttgttt ttccactagt tataagctca totttaagtg gtttctttgt tcttgatgaa	240
tcacatatag aatcagacgc tattgattta tgtagtaa atattgaaat ttcttgcaaa	300
aattttattg acagttccaa tgactgcata gctgtcctta cccattcga ggctcctaag	360
ctaagttcac taatcaaagt ccttaatggg attttgaata tttctggaga tgattcaata	420
gctaacgtta ctaatcctcc tattcttaat aacagaaatg atggtactot aagtgatatt	480
gaaaaaaata taaccatggc gcttaaatatc attaatcca atttagaaaa atcgcttact	540
ttagaaaacg tttctcaaag gatttatctc tcaccatcat acttaagtgc aatctttaaa	600
aattatttta atgacaattt tattaactat ataatctac aaaaaattgc acttgcacaa	660
gaaaaattaa ttttttcaaa tacaccaatt aataaattgg ctcatcaagt tggtttttca	720
cagacaagtt actttactaa aattttcaag caaaaagtag gaatgacacc atcaaagtat	780

cgaaaatata attccgcaat aaagaaaatc tatactattc caagagattt acaatggcgc	840
tcaaataagt cggtttatga aatctcaaaa gattttttca ataaaaatga tatttccttt	900
aaagcccggtg attttaatgg gtatccatat atctattcaa taaatgatct gaatgatgtt	960
agtaataaag caggttgggt ctatacagta gattgttctc aacctattat tccagctagt	1020
gagattaatg tatttgatcg ttcagtaatt caatggattt atactgaaaa aattatttaa	1080

<210> 57  
 <211> 282  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 57	
atgggacaag aagcacttgg ttttaattgaa accgaaggac ttgtagcttc aattgaagct	60
gtgatgcaa tggtaaaagc tgctaattgt aaattaattg gtcaagaaaa gattggatcat	120
ggattagtca cagtaatgggt tcgtgggtgat gttggagctg ttaaggcttc agttgatgcc	180
ggagtacaag ctgccgaaaa tattggagaa gttgtttcga gttacgtaat tcctcgtcct	240
caatctgaag ttgataagct cttaccgcat catggagaat aa	282

<210> 58  
 <211> 717  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 58	
atgaatgatt ttctgaattc tactagtact gttccagaat ttgttggtgc tagcgaaatt	60
ggagatacca ttggaatgggt aattccgaga gttgatcaac aactattaga taaattacac	120
gttacaaaac aatacaagac tttaggtatt ttgagtatgc gtactggtgc tggatccaca	180
attatggcaa tggatgaagg aattaaggct actaacatgg aatgtattga tgttgaatgg	240
ccacgtgata ctaaagggtg aggaggccat ggatgtttta ttatcatcgg tggatgatgat	300
cctgcagatg cagccaagc tattcgggtt gcacttgata atcttcacog tacatttgggt	360
gacgtttata acgccaagc gggtcacctt gaattacaat ttacagctcg tgctgcagggt	420
gctgcacatc ttggattagg tgcagttgaa gggaaagcat ttgggttgat ttgtggttgt	480

ccttccggga ttggtgtcgt gatgggagat aaggctttaa agactgctgg tgttgaaccg	540
cttaacttta cttcaccaag tcatggtaca agtttctcta acgaaggttg cctaactatt	600
accggtgact caggagctgt togtcaagct gttatggctg gacgtgaagt aggattaaag	660
ttattgtcac agtttgggtga agaaccagtt aatgatttcc catcatacat taagtag	717

<210> 59  
 <211> 570  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 59	
atgaagtctt tgggctatgt agaatgtaat ggattatctg gcgctattgt ggctgctgac	60
aggatgctaa aaactgcaga tgttgaactt agtagtattc aaaatacgaa aggtaatgga	120
tgggtcacct tacaagtttc tgggtgaacta tcagctataa ctgttgcggt tcaagctgta	180
aaagactatt tacctgatgt atatgtaacg tcagcgataa tagggcgtcc agcaataggg	240
ttgaactcct tgggcaaac agatttattg caaccaaac cagaaaagca gcaaatatt	300
gctgaaaagg aaaagggttc tgaaccatct tcaattaaag aagagatagt acagaatagt	360
gaaaattctg ctgaacctag tgttcaaact gagcgatcat tagagggcaa agatgaaac	420
gaagcttcgg attcgtctaa tgataaaca gataccaact ctaatgataa tgaagtcaca	480
tgcaatatgt gtggagatcc aaaatgtcca cggaaattag gagaaccgca taagaagtgt	540
atccattaca atgaattaaa gaaaaagtag	570

<210> 60  
 <211> 291  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 60	
atgaataacg ctttaggaat gattgaaaca cgcggattag ttgcatctat tgaagctgot	60
gatcaaatgg taaaggctgc taatgtaaca ttaactggcc aagaaaagat tggtagtgga	120
ttggtaactg ttatgattcg tggatgattt ggtgctgtaa aggctgccgt tgatgctggt	180
gtacaagctg ctgaagggtg cggcgaagtt gtatcgtctt acgtaattcc tcgtccacat	240

gaagaagttg aaaagatttt accaggtgga tcagattcag acgtgaata g 291

<210> 61  
 <211> 645  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 61  
 atggatgaag aacatttaag aacacttata cggacgattg ttagagaaac acttaatcct 60  
 aacctagttc caattggtgt ttcaaatac catgtacatt tgacggaaga agactttcaa 120  
 aagctattcc ctggtcaaaa gattgaaatg ctaaagaaac ttctgcaaca tgcggacttt 180  
 gctgcaaagc aaactgttga tctgatcggg cccaaaggca ccattgaaca tgttcgtcta 240  
 atggggccat accgttcaca ctacacagga gaaattgccc gttcagaaaa ctttactata 300  
 ggaattgatg ctccaattag aatgtctggt gatcttgatg gcaccccttc aattaagggt 360  
 cggtcacat atcggaagat tgaaattcaa ggtgtaattg ttgcaaagcg acacatccac 420  
 atgagtttag aagatgcaa gcgctttggc gtaaagctcg gtgattcaat gcaggttgaa 480  
 gtagatggcg atggtggacg taaaaccatt ttgatgacg tagttgctcg ccctcgtgaa 540  
 gaatttgtcc ttgaaatgca tattgatact gatgaagcca atgcagctaa tgcggacta 600  
 gtaataatt ctttcgaaa agttattatc aagaagaaaa actaa 645

<210> 62  
 <211> 504  
 <212> DNA  
 <213> Lactobacillus reuteri

<400> 62  
 atggataacc tagtacaaca ggttatgcaa cgattagaag aacgaaagca tacgagcgtt 60  
 gaagttactt ttaatacatca agttgcccgc ctagtgaac agatTTTTTT gagaaacgga 120  
 aaagttattc taaaagatat ttcgattgag ttaataacgg acttatattc aatggaaaag 180  
 actaacgott gggttaaatg ggtgttagaa ggaattagct atgatgttaa attttacttt 240  
 ttaattaatg aacagatggt taattttatt ccacgatga tgattttgga ctggccgac 300  
 ttgtttgttg taaataacga atcgccagta attgccagtt ataacggat tattaccaga 360

gaagagatag ctgctaaacc agataaatcg attcttgta gatatcaaaa gcaacatatt	420
acagatgaag cacttgatat ctgtaactat aaaaaatta aaataaagat taggactgaa	480
gaaaattgta tatggcgaga gtag	504

<210> 63  
 <211> 273  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 63	
atggcgagag tagtaggtag tgttggtgca acccaaaagg atccatcctt agttggaaag	60
aaactaatga tagttcaaca gattaattcc gaccaacaac cagttcgatt tgaacaagtt	120
gccgctgata cagtaaagtc tgggattggt gataatgtat taatagttcg tgggtgctggt	180
gcaagacgtg ctgataaaga gcgtgatgag gatcaagtaa gggacgttaa tgactgtacg	240
atagttggaa taattgaccg ttttgataag tag	273

<210> 64  
 <211> 609  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 64	
gtgtgcattg gaggcacaa aatggctatt tacacaaaag gtggtgacaa gggagaaaca	60
agtttattcg atggaacgag ggtacctaag gattcattac gagttgaaac ttatggaact	120
tttgatgaat taaacgctaa tattagtttg gcagataaat tctgtgaaag taaacgtaat	180
aagaagcttt tacaagagat cgaatataaa atgtttttcc ttcaaggatga gatagcgaca	240
gaaaaacggc agtatatttac tgataaaagt aagattatta ctgatgaaga tactcgaaaa	300
cttgaaaagg ttattgatga atatacatca aaactgccac ctgttcacatg ttttatctta	360
cctggttcga gtactcgggg tgcacaactt catatttctg gaacaatctg tcgtcgtgca	420
gagcgactat ttgtcgggct atcaaagaat gtaaaatttc gtccagagct agaaagatat	480
attaatcggt tgcgggattt tttatatatt gtagcgctg atgaagacta tgaagattta	540
ttaaatagtg taactgatga cgtgttaaaa atttacaac gttatcaaga agaaaaggat	600

gtgcgttaa 609

<210> 65  
<211> 474  
<212> DNA  
<213> Lactobacillus reuteri

<400> 65  
atgaacgagg aacaaattag taagattgtt gaaaacgtaa tcaagaataa tgcttctaaa 60  
aatctatttg atcggcaciaa aatggaaaaa gtaatcgatg cggctgtagc tcgtgctaata 120  
gaattgggtg ttggagtaac aattgctatt atgaaagctg atcaagtatt gcaaatgagc 180  
taccatatgc caaatgctaa tttagtaagt tgtacttttag ctccataaaaa ggcatggtca 240  
gcattagcaa tgaaggaacc taccaaggat attagtaagg atatccaacc aggtgccgga 300  
ttatatcaaa tggaaacaat gcttgatggt aagttagcat cttttgcagg tggatttcca 360  
ttgaagatta acgatgaaat tattggagcg attggtgtta gtggtggatt ggttgaagaa 420  
gatcaatcaa tttgtgaagc tgctgttgca gaatttttga aggagagtaa gtag 474

<210> 66  
<211> 348  
<212> DNA  
<213> Lactobacillus reuteri

<400> 66  
atggctaggc aggatatcaa acggacaatt caagaatatg ttccgggtaa acagtaaca 60  
ttagcacata tcgttgctaa ccctacgcca gacatttatg agaaattagg gatacaaaact 120  
cctaaaaatg cgcttggtat ttigacaata acgccaagtg aagcctcaat tatcgtggtg 180  
gatattgcta caaagtogag taatgttact ctagggttca ttgatcgatt tagtggctcg 240  
gttgtaattg tgggagaagt ttctgaaatt gaatcagctt tgcgtcatgt ggttgataag 300  
ctacaaaact tactgggggt ttgatgttct gaaattacac gaacataa 348

<210> 67  
<211> 795  
<212> DNA  
<213> Lactobacillus reuteri

<400> 67

atggcgaatc atcagcgaat tctagcgttt gaaaatggat ttaattttcg agatcttgg	60
ggttatagaa ctattgatgg cgaagtctg aaatggaata atcttggttcg ttctgcgc	120
ctctcctatt ttacacataa tgagcaaaga aaactttatg gatatggat taggacaatt	180
attgactttc gttcaacttc cgaagtagct ttttatcccg accaattaac atcattgatg	240
aattatattc ggataccggg ctttgagaat gacottactg aaagtaatat tagtattgct	300
gaagcacgaa aaagtttttc aaaggatcca caagcgggtt ttaatogcat gatggaagta	360
tattgtcaat ttgtcactga tgagaaagca caagaagcat ttcacacctt tattaataaa	420
ttatgcctac attcagcgca ggggtggtgtt ttatttcatt gctctgcggg gaaagaccgt	480
actggtttag gagcaattta ttactaagt cttctacaag ttccagtaga tataatttat	540
caagattata ttttaactaa taaagcatca acaaaaagga taaaagaacg attacgttat	600
gctataaaaa ataacctagg tgataattat cttcactcaa tttacgatct ttcaacagca	660
aatagggtgtt attatgatca agcaatctct cttattaata ataatatgg tggaatgacc	720
tcttacttaa aagatgtgtt acaaatcagt gattcaatgg ttgaacaact aagatactta	780
tatctgacaa agtga	795

<210> 68

<211> 321

<212> DNA

<213> *Lactobacillus reuteri*

<400> 68

atgtattttg atgttgaaac gaatgacgtg cgaccacatt caattttgat aaatcaaggc	60
gaaaactttg aacatgctcg tgcacgaata tggtcatttt tattggatac ttcttataag	120
tatccacaac aaaatatttt aataattaca catggctgga taataaaaaa tatcatttcg	180
ttgtgtcttg agaatatga tgggacttca ttcaaaaatc ccaataatct aagtattagt	240
aagatccaat tgaatccggc attaaagcag caacgaatat gttattataa tcgaccgttc	300
atagggacga tgatattatg a	321

<210> 69

<211> 558  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 69  
 atgagtctta ttacaattct ttgatattt gtgggactta atattgatac gtttattgca 60  
 ctattatttc ttttacgaaa ctataattac cggttaccga ttattggcct tggagtagca 120  
 acgcttattt tatggatctt tggggtaatt ttaggaaaag ggctagcatt tctatttcca 180  
 gattggatta caggatttat gggcattatt ttaatcttta tagcgctttt tgaacaggat 240  
 gacgaaaaaa agacaactaa tacaagtttt ctctcattac ttctgttttg tttaagcctt 300  
 ggtggagata atcttgctgt ttatattcca ttggtggta accttagttg gagtacagatt 360  
 atatacgtag gaataatttt tgaattttgt tcagtcctat taattctatt aggaaaacaa 420  
 tttgttttaa taaaacctgt ggcatatttg ttggaaaaat atggtaattt tggaagcaaa 480  
 attgtttatg ttttagcggg tttatatatt atttgaata gtcatttaat taatcacctt 540  
 attagaattt ttaattaa 558

<210> 70  
 <211> 429  
 <212> DNA  
 <213> *Lactobacillus reuteri*

<400> 70  
 atgaaacgaa ctatgtttat cggagcaata gcatgttgta aaacaaccct tactcaacga 60  
 ttagaaaaac aacaaattaa atataataaa acacaagcaa ttgaattttc atcaaatatt 120  
 attgacacac caggagaata tatggagcat cataatatga tgagcacgtt acgtgtaacc 180  
 tcgatggatg ctgatatagt tgttttatia caaagtgcgg ttgacaaacg acttgttttc 240  
 ccggctggct tctgttcaat gttttcgaaa cctacttttag gtgtagttac aaagattgat 300  
 cttgtaaaag accctgccga cattgaatat tccaagaatc ttctgttaag cgctggggta 360  
 aagaaggtaa ttctgtttc ggcagttgaa aatattaata tcgataaatt agttgctgaa 420  
 cttaattaa 429

<210> 71



<211> 65  
 <212> DNA  
 <213> Artificial

<220>  
 <223> Synthetic DNA

<400> 71  
 atggaccgca ttattcaatc accgggtaaa tacatccagg gcgctgatgt gattaatcgt 60  
 taacc 65

<210> 72  
 <211> 58  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

<400> 72  
 ctgggcgaat acctgaagcc gctggcagaa cgctggtag tggtgggtga caaatttg 58

<210> 73  
 <211> 1257  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

<400> 73  
 atggaccgca ttattcaatc accgggtaaa tacatccagg gcgctgatgt gattaatcgt 60  
 taaccatgtt caaaacgacg ctctgcgcct tattaattac cgctctttgc tccacatttg 120  
 ctgcccctca acaaatcaac gatattgtgc atgcacaaat taccocgctt atagagcaac 180  
 aaaagatccc gggatggcg gtggcggtaa tttatcaggg taaaccttat tactttacct 240  
 ggggctatgc ggacatgcc aaaaagcagc ccgtcacaca gcaaacgttg tttgagttag 300  
 gttcgggtcag caaaacattt actggcgtgc ttggtggcga cgctattgct cgaggggaaa 360  
 tcaagttaag cgatcccaca aaaaaatact ggctgaact taccgctaaa cagtggaaatg 420  
 ggatcacact attacatctc gcaacctaca ctgctggcgg cctgccattg caggtgccgg 480

atgaggtgaa atcctcaagc gacttgctgc gcttctatca aaactggcag cctgcatggg	540
ctccaggaac acaacgtctg tatgccaact ccagtatcgg tttgttcggc gcactggctg	600
tgaagccgtc tggtttgagt tttgagcagg cgatgcaaac tcgtgtcttc cagccactca	660
aactcaacca tacgtggatt aatgtaccgc ccgcagaaga aaagaattac gcctggggat	720
atcgcgaagg taaggcagtg catgtttcgc ctggggcggt agatgctgaa gcttatggtg	780
tgaagtcgac cattgaagat atggcccgtt ggggtgcaaag caatttaaaa ccccttgata	840
tcaatgagaa aacgcttcaa caagggatac aactggcaca atctcgctac tggcaaaccg	900
gcgatatgta tcagggcctg ggctgggaaa tgctggactg gccggtaa at cctgacagca	960
tcattaacgg cagtgacaat aaaattgcac tggcagcacg ccccgtaaaa gcgattacgc	1020
ccccaactcc tgcagtacgc gcatcatggg tacataaaac aggggcgacc ggcggatttg	1080
gtagctatgt cgcgtttatt ccagaaaaag agctgggtat cgtgatgctg gcaaaacaaa	1140
actatcccaa tccagcgaga gtcgacgccg cctggcagat tcttaacgct ctacagtaac	1200
tgggcgaata cctgaagccg ctggcagaac gctgggttagt ggtgggtgac aaatttg	1257

<210> 74  
 <211> 50  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

<400> 74	
ggaatttagg tttttcgcaa accagctatt tttgcaaagt gtttcgccag	50

<210> 75  
 <211> 50  
 <212> DNA  
 <213> Artificial

<220>  
 <223> synthetic DNA

<400> 75	
atcgataccc ccggggaata tctggaaaac cgctgcctgt acagtgcact	50

